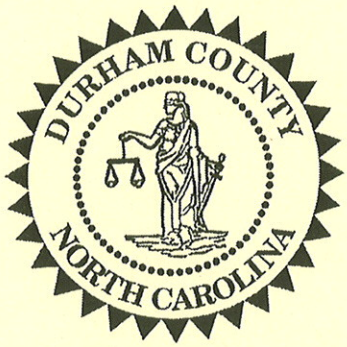

Durham County
Neuse River Basin Nutrient Sensitive Waters Management Strategy

Stormwater Plan

Last Amended: May 14, 2007

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Durham County
Neuse River Basin Nutrient Sensitive
Waters Management Strategy Stormwater Plan
May 14, 2007

The Neuse River Basin Nutrient Sensitive Water Management Strategy adopted in December of 1997 required the County of Durham and 14 other local governments to develop and implement a stormwater management strategy to control nitrogen runoff. The Neuse River Basin includes northern and eastern parts of Durham County. Other jurisdictions subject to the stormwater requirements include the cities of Cary, Durham, Garner, Goldsboro, Havelock, Kinston, New Bern, Raleigh, Smithfield, Wilson and the Counties of Johnston, Orange, Wake and Wayne.

The elements that must be included in the local government stormwater management program are:

1. **New Development Review/Approval**
2. **Illegal Discharge**
3. **Retrofit Locations**
4. **Public Education**
5. **Annual Reporting**

Each program element is described in more detail below.

1. New Development Review/Approval

The Neuse River Basin stormwater management requirements for new development consist of nitrogen reduction and peak flow control. New development is defined as any single family or duplex residential development or a recreational facility that disturbs more than one acre of land or any multi-family residential, commercial, industrial, or institutional development that disturbs more than one half acre of land. Land disturbance includes but is not limited to: tree removal, grubbing, stump removal, removal of topsoil, course or fine grading, erection of structures and construction of roads.

Stormwater management requirements for new development limit the nitrogen load to 70% of the 1995 average nitrogen load and maintain the pre-development peak flow rate for the 1-year, 24-hour storm.

The Neuse Stormwater Rules also require local governments to ensure that riparian areas are protected on new development.

- **Land Use Planning Provisions**

  Durham has been on the cutting edge of urban planning for a number of years. Over the last decade the Durham City/County Planning Department has been evaluating a number of measures to facilitate and promote "smart growth" and to improve protection of the environment. Initiatives include development of the Durham 2020 Comprehensive Plan, a Natural Resources Protection Ordinance, and adoption of zoning ordinances and amendments to implement various planning provisions. These are discussed below.

  Comprehensive Land Use Plan

  The Durham 2020 Comprehensive Plan, adopted by the Board of County Commissioners December 11, 1995, addressed many of the measures listed in the Model Program. Three of the neighborhoods considered in the 2020 Plan are

suburban neighborhoods, urban neighborhoods and compact neighborhoods. One of the land use objectives for suburban neighborhoods in the 2020 Plan is to "...encourage clustered development where possible." For urban neighborhoods the objectives include protecting the integrity of established neighborhoods while encouraging new moderate density, mixed use development, and increasing housing density in existing neighborhoods with sensitive in-fill. The 2020 Plan also defines the Urban Growth Area which details the intended limits on dense development.

The 2020 Plan States:

> "Compact Neighborhoods form the heart of the Durham 2020 Comprehensive Plan and will be a new feature on the urban landscape...The primary objective is to create 15 to 20 high and moderate intensity, mixed use neighborhoods, including transit stations, public parks, and plaza, while respecting the integrity of surrounding established neighborhoods...Over the next 25 years, Durham wants to locate up to 20 percent of new housing units and 45 percent of new employment in Compact Neighborhoods...While a central theme of Durham's plan, Compact Neighborhoods constitute a relatively small proportion of the Durham Planning Area, comprising about 5 percent."

As envisioned in the 2020 Plan, Compact Neighborhoods will be located within the Regional Corridors identified on the Community Growth Map and will consist of a core area of 30 to 50 acres centered around a transit station, and a support area of about 450 to 500 acres.

In beginning to implement the 2020 Plan and other planning initiatives, Durham has already reduced minimum road widths, eliminated the requirements for curb-and-gutter in residential subdivisions, made provisions for clustered developments and made provisions for mixed use developments. As Durham moves forward with its smart-growth initiatives it may continue to make adjustments in these areas to further the County's planning goals.

Reducing road widths

The standard minimum road width under NCDOT criteria is 18 feet. Durham has reduced minimum design requirements for public and private residential streets. Minimum pavement width now varies between 18, 20 and 22 feet for roads without curb, depending upon the number of residential units served and the traffic loading. Minimum width for alleys is now 15 feet. Durham provides flexibility to developers in allowing cul-de-sac and Tee type turnarounds in residential subdivisions.

Reducing minimum parking requirements

The Zoning Ordinance has been revised to reduce parking requirements. The nitrogen loading provisions will act as a disincentive to adding excessive amounts or rarely used parking.

Incentives will be provided under the aegis of the Transportation Demand Management (TDM) standards that were added to the zoning ordinance in January 2000. The TDM standards require shopping centers to provide park and ride areas and that employment centers give preference to car pool spaces and provide for bicycle parking. Other provisions of the TDM standards require large employers in Durham to develop a TDM plan and provide staff support to the TDM programs. Implementation of the TDM standards will reduce the need for excess parking.

Minimum use of curb and gutter

Durham has already eliminated requirements for curb and gutter in public and private residential streets except in high traffic volume collector streets.

Cluster or open-space developments

Durham has adopted performance standards allowing cluster development generally in zoning ordinance section **8.1.10 Clustering Standards** and also in the section on watershed overlay zoning districts in section **5.5.10 Cluster Developments.** Additional steps in this direction include adoption of performance standards allowing so-called zero lot line development in zoning ordinance section **8.1.11 Zero Lot Line Development,** which allows the side yard requirement to be eliminated on one side of each lot.

Traditional neighborhood developments

There are no obstacles to developing traditional neighborhoods in appropriately zoned areas of Durham County.

Mixed-use developments

As indicated in the 2020 Plan, mixed-use development is an essential focus for the next 20 years. Durham Zoning Ordinance section **4.B.2 Mixed Use District (MU)** describes the current available general zoning district for mixed-use developments. The purpose of this zoning district is "to provide innovative opportunities for an integration of diverse but compatible uses into a single development that is unified by distinguishable design features. In addition to a mixture of compatible uses, developments in this district shall provide amenities and walkways to increase pedestrian activity, decrease reliance on individual vehicles, foster transit usage, enhance the attractiveness of Durham City and County, improve the overall quality of life, and provide for the welfare of the citizens."

Natural Resource Protection Standards

Nitrogen control from new development will be assisted and promoted by adherence to the Natural Resource Protection Standards, Zoning Ordinance Section 11. The standards:

- Preserve and maintain buffers adjacent to intermittent and perennial streams in an undisturbed, natural state in order to enhance and maintain water quality, protect stream channel wetlands, minimize stormwater runoff, and reduce sedimentation and erosion; channel wetlands and vegetated, natural stream buffers are effective at removing excess nitrogen;
- Preserve and maintain buffers adjacent to natural wetlands to conserve and maintain them in an undisturbed, vegetated state; natural wetlands are effective at removing excess nitrogen through de-nitrification;
- Restrict development on steep slopes, which will protect wetlands and water courses below the slope from increased sedimentation; protection of wetlands, riparian areas and natural water courses help to preserve and maintain the effectiveness of these natural features in removing nitrogen;
- Restrict development in floodplains to preserve and maintain the floodplain in an undisturbed, vegetated state in order to maintain flood storage capacity, control stormwater, and improve water quality; this helps to keep development away from major streams so that natural processes can help to remove the nitrogen before it enters streams; it also helps by providing further protection for streams, riparian areas and wetlands.

In December 1999, the Durham City/County Planning Department hosted a conference entitled "Growing Smarter: A Toolbox for Change." The conference focused on Smart Growth tools available now or "in the pipeline" that elected officials, developers, and citizens could use to implement Smart Growth. The conference provided recommendations and action items for future initiatives, including open space acquisition and further development of greenways. See www.ci.durham.nc.us/planning/121199/Index.html

Nitrogen reduction

The nutrient load contributed by new development activities is held at 3.6 pounds per acre per year. This is equivalent to 70% of the 1995 average non-urban nitrogen load.

There are three approaches that a developer can use alone or in combination to meet the Neuse River Basin nitrogen export limit requirements:

1. Treat the stormwater runoff to reduce nitrogen export to surface waters.
2. Pay a one-time offset fee to fund wetland or riparian restoration through the North Carolina Wetland Restoration Program.
3. Limit imperviousness.

The nitrogen export from each new development must be calculated. This export will be calculated in pounds per acre per year (lbs/ac/yr). There are two different methodologies proposed for calculating nitrogen export from new developments. These are as follows:

Method 1 is intended for residential developments where lots are shown but the actual footprints of buildings are not shown on site plans. This method does not require calculation of the area of building footprints. Rather, the impervious surface resulting from building footprints is estimated based on typical impervious areas associated with a given lot size. This method is shown in Figure 2a.

Method 2 is for residential, commercial and industrial developments when the entire footprint of the roads, parking lots, buildings and any other built-upon area is shown on the site plans. This method is simpler and more accurate since it does not require estimating the impervious surface based on lot size like Method 1 does. Method 2 is shown in Figure 2b.

Figure 2a: Method 1 for Quantifying TN Export When Building and Driveway Footprints Are Not Shown

Step 1:	Determine area for each type of land use and enter in Column (2).
Step 2:	Total the areas for each type of land use and enter at the bottom of Column (2).
Step 3:	Determine the TN export coefficient associated with right-of-way using Graph 1.
Step 4:	Determine the TN export coefficient associated with lots using Graph 2.
Step 5:	Multiply the areas in Column (2) by the TN export coefficients in Column (3) and enter in Column (4).
Step 6:	Total the TN exports for each type of land use. Enter at the bottom of Column (4)
Step 7:	Determine the export coefficient for site by dividing the total TN export from uses at the bottom of Column (4) by the total area at the bottom of Column (2).

(1) Type of Land Cover	(2) Area (acres)	(3) TN export coeff. (lbs/ac/yr)	(4) TN export from use (lbs/yr)
Permanently protected undisturbed open space (forest, unmown meadow)		0.6	
Permanently protected managed open space (grass, landscaping, etc.)		1.2	
Right-of-way (read TN export from Graph 1)			
Lots (read TN export from Graph 2)			
TOTAL			

Figure 2b: Method 2 for Quantifying TN Export from Residential / Industrial / Commercial Developments when Footprints of all Impervious Surfaces are Shown

Step 1: Determine area for each type of land use and enter in Column (2).

Step 2: Total the areas for each type of land use and enter at the bottom of Column (2).

Step 3: Multiply the areas in Column (2) by the TN export coefficients in Column (3) and enter in Column (4).

Step 4: Total the TN exports for each type of land use and enter at the bottom of Column (4).

Step 5: Determine the export coefficient for site by dividing the total TN export from uses at the bottom of Column (4) by the total area at the bottom of Column (2).

(1) Type of Land Cover	(2) Area (acres)	(3) TN export coeff. (lbs/ac/yr)	(4) TN export from use (lbs/yr)
Permanently protected undisturbed open space (forest, unmown meadow)		0.6	
Permanently protected managed open space (grass, landscaping, etc.)		1.2	
Impervious surfaces (roads, parking lots, driveways, roofs, paved storage areas, etc.)		21.2	
TOTAL		---	

The rule requires that all new developments achieve a nitrogen export of less than or equal to 3.6 pounds per acre per year. If the development contributes greater than 3.6 lbs/ac/yr of nitrogen, then the options shown in Table 2a are available based on whether the development is residential or non-residential.

Table 2a: Nitrogen Export Reduction Options

Residential	Commercial / Industrial
If the computed export is less than 6.0 lbs/ac/yr, then the owner may either: 1. Install BMPs to remove enough nitrogen to bring the development down to 3.6 lbs/ac/yr. 2. Pay a one-time offset payment of $[redacted]/lb to bring the nitrogen down to the 3.6 lbs/ac/yr. 3. Do a combination of BMPs and offset payment to achieve a 3.6 lbs/ac/yr export.	If the computed export is less than 10.0 Lbs/ac/yr, then the owner may either: 1. Install BMPs to remove enough nitrogen to bring the development down to 3.6 lbs/ac/yr. 2. Pay a one-time offset payment of $[redacted]/lb to bring the nitrogen down to the 3.6 lbs/ac/yr. 1. Do a combination of BMPs and offset payment to achieve a 3.6 lbs/ac/yr export.
If the computed export is greater than 6.0 lbs/ac/yr, then the owner must use on-site BMPs to bring the development's export down to 6.0 lbs/ac/yr. The owner may use one of the three options above to achieve the reduction between 6.0 and 3.6 lbs/ac/yr.	If the computed export is greater than 10.0 lbs/ac/yr, then the owner must use on-site BMPs to bring the development's export down to 10.0 lbs/ac/yr. The owner may use one of the three options above to achieve the reduction between 10.0 and 3.6 lbs/ac/yr.

Table 2b: BMP Types, TN Removal Rates and Design Standards

BMP Type	TN Removal Rate Based on Current Literature Studies	Appropriate Design Standards
Wet Detention Ponds	25%	NC and MD Design Manuals
Constructed Wetlands	40%	NC and MD Design Manuals
Open Channel Practices	30%	NC and MD Design Manuals
Riparian Buffers	30%	Neuse Riparian Buffer Rule (15A NCAC 2B .0233)
Vegetated Filter Strips With Level Spreader	20%	NC and MD Design Manuals and other literature information
Bioretention	25%	NC and MD Design Manuals
Sand Filters	35%	NC and MD Design Manuals
Proprietary BMPs	Varies	Per manufacturer subject to DWQ approval
Other BMPs	Varies	Subject to DWQ approval

Maintain pre-development peak flow rates

The Neuse Stormwater Rule requires that new development must maintain the pre-development peak runoff rate from the one-year, 24-hour storm. The One-year 24-hour storm means the surface runoff resulting from a rainfall of an intensity expected to be equaled or exceeded, once a year, and of a duration which will produce the maximum peak runoff flow form the watershed of interest under average antecedent wetness conditions. Acceptable methodologies for computing these flow rates include:

1) The Rational Method, which may be used for drainage areas of 200 acres or less,
2) The Peak Discharge Method as described in the USDA Soil Conservation Service's Technical Release Number 55, which may be used for drainage areas of 2000 acres or less, and
3) The Putnam Method, which may be used for drainage areas greater than 2000 acres.

The flow control requirement is not required for developments that meet one or all of the following requirements:

When the peak flow rate does not increase by more than 10%, no controls will be required.

New development requirements to protect and maintain existing riparian areas

The Neuse Stormwater Rule requires local governments to insure that riparian areas are protected in accordance with the Riparian Buffer Rule (15A NCAC 2B.0233).

The Neuse Stormwater Rule requires local governments to ensure that 50-foot riparian buffers on both sides of intermittent and perennial streams and around lakes, ponds, and estuaries are maintained and protected from new development. The County may either request delegation from the state and implement all applicable provisions of the buffer rule or disapprove any new development that impacts the buffer unless the applicant can demonstrate that the NC Division of Water Quality has approved the activity.

Local governments seeking delegation must comply with the following requirements:

- Have land-use jurisdiction for the riparian buffer
- Have the necessary administrative organization, staff, legal authority, financial, and other resources to implement and enforce the requirements
- Have necessary ordinances, regulations, and resolutions to establish and maintain the buffer requirements
- Have an enforcement plan to address violation
- Appoint a Riparian Buffer Protection Administrator
- Train staff to understand, implement, and enforce the buffer program
- Review proposed uses within the riparian buffer, issue approvals/denials, and provide for appropriate mitigation provisions
- Conduct onsite determinations if a map is in question
- Review and approve/deny minor variance requests (major variances are approved or denied by the Environmental Management Commission)

Durham County does not propose to request delegation from the State.

Per sections 14-153(a)(3) and 14-155(b) of the proposed ordinance, any new development activity that is proposed to take place within the first 50 feet adjacent to a waterbody that is shown on either the USGS topographic map or the USDA Soil Survey maps will be disapproved unless the owner can show that the activity has been approved by DWQ. DWQ approval may consist of the following:

- An Authorization Certificate that documents that DWQ has approved an allowable use such as a road crossing or utility line. A detailed list of allowable uses is included in the Riparian Buffer Rule.

- An opinion from DWQ that vested rights have been established for the proposed development activity.
- A letter from DWQ documenting that a variance has been approved for the proposed development activity.

2. Illegal Discharges

The Neuse Stormwater Rule requires that all local governments establish a program to prevent, identify, and remove illegal discharges. Illegal discharges are flows in the stormwater collection systems that are not associated with stormwater runoff or an allowable discharge.

One of the first steps in setting up an illegal discharge program is to establish legal authority. Staff proposes to accomplish this by amending Chapter 14 of the County Ordinance to add Article V "Stormwater Management," in particular Section 14-158. This will establish the County's legal authority to:

- Control the contribution of pollutants to the stormwater collection system associated with industrial activity
- Prohibit illegal discharges to the stormwater collection system
- Prohibit discharge of spills and disposal of materials other than stormwater to the stormwater collection system
- Determine compliance and non-compliance
- Require compliance and undertake enforcement measures in case of non-compliance

The information that is to be collected for the County includes:

- Sanitary sewer location in areas of major storm sewer systems and locations not served by sanitary sewers
- Waters that appear on soil survey maps and USGS quad maps
- Land use categories, including undeveloped, residential, commercial, agricultural, industrial, institutional, and publicly owned open space
- Currently operating and known closed municipal landfills and other treatment, storage, and disposal facilities
- Major stormwater controls
- Known NPDES permitted discharges to the stormwater collection system

This information is, for the most part, currently available in the GIS system and will be used to produce the required map(s) at a 200 scale.

Written descriptions for the map components are as follows:

- A summary table of municipal waste facilities that includes the names of the facilities, the status (open/closed), the types, and addresses
- A summary table of the NPDES permitted dischargers that include the name of the permit holder, the address of the facility and permit number.
- A summary table of the major structural stormwater control structures that shows the type of structure, area served, party responsible for maintaining, and age of structure.
- A summary table of publicly owned open space that identifies size, location, and primary function of each open area.

The second level of information is more detailed and is needed for screening high priority areas within the County. The first part of the field screening process for high priority areas is mapping the stormwater collection system. The second part of the field screening process is conducting a dry weather inspection of all of the outfalls identified above to detect possible illegal discharges.

The dry weather field screening will use the state's 303(d) list to focus efforts on areas with a high potential for illegal discharges. Additionally, information received from complaints will be used to determine the location of illegal discharges. The field screenings will not occur within 72 hours following rain events of 0.1 inches or greater.

If the field screening shows that an outfall has a dry weather flow, a report will be produced. The information contained in the report includes:

General Information:

- Sheet Number
- Outfall ID Number
- Date and Time
- Date, Time and Quantity of Last Rainfall Event

Field Site Description Location:

- Type of Outfall
- Dominant Watershed Land Use(s)

Visual Observations

- Photograph
- Odor
- Color
- Clarity
- Floatable
- Deposits/Stains
- Vegetation Condition
- Structural Condition
- Biological
- Flow Estimation

After the field screening and sampling are complete, the County is required to identify and remove illegal discharges. Methods of identifying potential illegal discharges may include:

- Site investigation
- Additional chemical analysis
- Flow monitoring
- Dye testing
- Smoke testing
- TV inspection
- Citizen complaints

Once an illegal discharge is found, the County is required to take enforcement action to have the source removed. The legal authority established, Sections 14-158 and 14-162, will be used to accomplish this.

The County is required to contact persons/establishments that are likely sources of illegal discharges and inform them of the requirements of the illegal discharge program. The County will also establish a hotline that will include a recording advising citizens of what to do if they call during non-business hours.

3. Retrofit Locations

Another component of the stormwater plan is to identify retrofit locations. Retrofit locations are sites within existing developments that have the potential to reduce nitrogen export with the installation of an appropriate Best Management Practice (BMP).

Local governments are required to establish a program to identify potential retrofit sites. Since these rules were written to protect the Neuse River Basin, the required retrofit sites will have to be located within the Neuse River Basin. Based on the County's 1997 population, Durham County will be required to identify a minimum of three retrofit sites annually. A cooperative effort utilizing the Durham Soil and Water Conservation District and the Durham County Cooperative Extension Service Office is being explored.

In order to be considered an acceptable retrofit site, the following conditions will have to be investigated:

- The retrofit clearly has the potential to reduce nitrogen loading to the receiving water.
- The watershed is clearly contributing nitrogen loading above background levels
- The landowner where the retrofit is being proposed has to be willing to have the retrofit installed on his property
- There is adequate space and access for the retrofit

Once these sites are identified a list of them will be forwarded to the Division of Water Quality via an annual report on October 30th of each year beginning in 2001. The list will include maps detailing:

- The drainage area to the retrofit opportunity site
- Land used within the drainage area
- Location of retrofit opportunity
- Property boundaries in the vicinity of the retrofit opportunity
- Significant hydrology (as depicted on U.S.G.S. topographic maps and USDA-NRCS Soil Survey Maps
- Roads
- Environmentally sensitive areas (steep slopes, wetlands, riparian buffers, endangered/threatened species habitat - where available).
- Publicly owned parks, recreational areas, and other open lands.

DWQ may then notify the following organizations of the opportunities for retrofitting:

- Clean Water Management Trust Fund
- N.C. State University Cooperative Extension Service
- Triangle J Council of Governments
- Environmental Programs at:
  - N.C. State University
  - Duke University
  - University of North Carolina
  - East Carolina University
- N.C. Sea Grant
- USDA - Natural Resources Conservation Service
- Upper Neuse Basin Association
- Lower Neuse Basin Association
- N.C. Wetland Restoration Program

4. Education Program

The Neuse Stormwater Rule requires that the County of Durham develop an environmental education program to address nitrogen-loading issues.

The public education action plan shall consist of activities from each of the two categories listed in the table below. In addition to the activities listed below, the action plan must include two technical workshops, one designed for elected and other public officials and one designed for the development community, including engineers, architects, developers, contractors, surveyors, planners, and realtors, during the first year of the program.

Category 1	Category 2
Demonstration sites	Fact Sheets
"Adopt-A-Program"	Environmental Freebies
Quarterly Newspaper Articles	Fertilizer Tags
Storm Drain Marking	Flyers
Recognition Program	Postmarks
Web Page	Utility Bill Inserts
Local Cable TV Program	Close Out Packages
Toll Free Hotline for Reporting Environmental Problems	Speak to Civic Groups Quarterly
Environmental Field Day	
Environmental Contest	

Based on Durham County's 1997 population of 37,292, we are required to undertake two Category 1 activities and two Category 2 activities. However, if we choose to use effective major media advertising, either independently or through a cooperative effort, the County would be exempt from the minimum Category one and two requirements.

Currently, Durham County is working with Triangle J Council of Governments (COG) and other affected jurisdictions in a cooperative effort to produce an effective advertising campaign using major media. Durham County is also exploring the resources available to satisfy the public education obligation through it's own Public Information Office and the Durham County Cooperative Extension Service Office.

5. Annual Reporting

Annual Neuse River Basin Stormwater Program reports will be submitted to the Division of Water Quality by October 30 of each year beginning in 2001. All reports shall contain a summary of activities in each of the four plan elements.