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September 13, 2007

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1617 Mail Service Center
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North Carolina Environmental Management Commission
1617 Mail Service Center
Raleigh, NC 27699-1617

SUBJECT: Comments on Draft Jordan Water Supply Nutrient Strategy Rules

Dear Commissioners:

The City of Durham, through detailed analysis provided by the professional staff of our Department of Public Works, Engineering and Stormwater Services Division, appreciates this opportunity to submit comments on the draft Jordan Lake Rules. The City of Durham has been proactive in protecting valuable resources such as Jordan Lake, providing biological nutrient removal at the South Durham plant prior to passage of the Clean Water Responsibility Act (HB515) and adopting city-wide riparian buffers well before passage of Neuse buffer requirements. There are more than 400 stormwater treatment BMPs in Durham helping to protect downstream resources, and staff anticipates revising the City's stormwater treatment requirements this fall to enhance protection of both Jordan Lake and Falls Lake.

The draft Jordan Lake rules would subject local governments in the Triangle Region to the most stringent target reductions in the state. Using nationally recognized sources, the City has estimated capital and operating costs to retrofit existing development as $334 million, or $6,750 per household. Over the entire watershed the Existing Development Rule will cost more than $2 billion, more than 3 ½ times the estimate in the Fiscal Analysis. These costs are unprecedented.

Certainly controls are needed to keep nutrient loads from increasing, but the benefits of reducing loads have not been established. Recreational and water supply uses are already being realized. Water quality in Jordan Lake is better than it was predicted to be before it was built. Nitrogen loads to the lake from New Hope Creek at Stagecoach Road and from the Haw River at Bynum have been declining according to recent studies. Jordan Lake is recognized as one of the most productive fisheries in North Carolina, and significant reduction in nutrient inputs would reduce its productivity. It is not clear who would benefit from reductions in load.

Given the unprecedented $2 billion dollar cost of the Existing Development Rule alone and the other environmental and social priorities facing our communities, the rules need to be reconsidered, and either scaled back with respect to existing development, or else provide for funding so that users of this resource, or the state as a whole, bear the majority of the costs.

Our greatest concerns involve the Existing Development Rule, addressed immediately below. Comments on the other rules follow, appearing in the same sequence that they appear in the draft rules. Our comments pertain both to the proposed rule and to the Fiscal Analysis required to support rule-making. Citations to the Fiscal Analysis are abbreviated "FA Chapter X."

15A NCAC 02B .0266 – Stormwater Management for Existing Development

No previous Nutrient Management Strategy or TMDL in North Carolina has required local governments to retrofit existing development to treat stormwater runoff. The current rule requires the City of Durham to achieve a 35% reduction in nitrogen from the baseline period, which will not be possible unless all development is treated, with some development being treated by two BMPs in series. More than two square miles of the City will have to be devoted to stormwater treatment to achieve this level of reduction.

We have estimated the cost of retrofitting using the same reference sources used in the Fiscal Analysis, plus additional newer publications funded by EPA. Based on achieving a 35% reduction our estimates indicate that in the City of Durham alone, retrofitting will cost $334 million, not including the reduction in tax revenue that would occur as a by-product of extensive land acquisition.

To put the Existing Development Rule costs in perspective, $334 million:

- Works out to be $6,750 per family.
- Is nearly 18 times the City's fund balance
- Is equivalent to 75% of Durham's total General Obligation bonded debt for the period 1986 to present (20 years)
- This would make stormwater retrofits on existing development the single largest debt financed public improvement in the City's history

Please note that these costs are only for Jordan Lake, and that half the City drains to Falls Lake which is facing similar reduction requirements. Retrofits that will be required for Falls Lake are expected to be similarly expensive.

While the latest version of the existing development rule allows local government to evaluate other options for reducing nitrogen and phosphorous loads, the Fiscal Analysis focused on retrofitting, and we understand that retrofitting existing development to treat stormwater runoff is expected to be the core strategy for achieving reductions. As read, the rule requires the City to achieve a level of reduction. The rule does not focus on locating retrofits on publicly-owned

land. The rule does not focus on using BMPs that are cost-effective. The rule does not target only land-uses that have high loads. In fact, as written there are no exclusions for forested land or lower density development.

We are concerned about the apparent lack of any reasonable limits on what local governments may have to do to achieve reductions. The lack of limits, clarity and guidance in the rule suggests that our cost estimates may be low.

Nevertheless, our cost estimates are at least 3.8 times higher than those in the Fiscal Analysis because we have accounted for the higher cost of retrofitting compared to new development, and have included more accurate land cost information. Underestimated costs will result in unrealistic expectations on the part of the rate-paying public who will have to pay for the rules and also on the part of regulators and environmental advocates who expect the favorable costs to result in relatively rapid implementation.

1. Land required for treatment – In order to achieve 35% reduction, more than two square miles of the City will have to be devoted to stormwater treatment serving existing development. As shown in tables further below, land area requirements appear to be similar for a variety of BMP mixes. BMPs that take up less space are often smaller, requiring more of them, and therefore when the additional area required for access and maintenance to each BMP is considered, total area requirements do not vary widely. As a rough check, in new development, between 5% and 7% of the drainage area is set aside for stormwater treatment. Developed land in the City of Durham that drains to Jordan Lake comprises more than 23,000 acres. While some of this land is very low density and would not require retrofitting, at least some sites will require two BMPs in series to achieve 35% reduction in nitrogen. In order to reduce nitrogen in stormwater runoff by 35% using stormwater treatment retrofits, more than two square miles of the City will be occupied by stormwater BMPs. Acquisition of the land to install retrofit stormwater treatment will remove these lands from the City's tax roles forever. Removal of roughly $174 million dollars in land from the City's tax roles will have a severe impact on revenues to support public education and other essential public needs.

2. Flawed basis for cost estimates for the Existing Development Rule – The Fiscal Analysis cost estimate is fundamentally flawed, resulting in a severe underestimate of the total cost of complying with the Jordan Lake Rules. The major errors that bias the costs on the low side include:
    a. Construction costs were based on costs for new development, and did not account for site constraints, higher excavation costs, and greater construction contingencies.
    b. Area requirements for retrofits included only the surface area of the pool plus 15% added to account for interior slopes based on optimal configuration, and do not account for site constraints or provide for maintenance or access.
    c. Land cost developed from data provided by the City of Durham inexplicably finds the average cost to be $78,000 per acre, whereas land values in Durham range from an

average of $92,000 for low density residential at the low end up to $374,000 per acre for high density residential property. Opportunity costs were assumed to be zero.

d. Planning costs, primarily surveying and engineering design, were assumed to be 25% which too low to account for the greater engineering complexity required to address site constraints and regulatory issues involved in retrofitting.
e. Current estimates are that stormwater treatment retrofits have a life expectancy of 20 years or less. For the 30-"full" year implementation period in the Fiscal Analysis, required reconstruction costs have not been included.
f. The amount of developed land in the watershed is greater than indicated in the watershed model; not only did this result in unit loading rates (pounds per acre per year) being higher than reported elsewhere, it also results in the area of land actually needing retrofits to be under reported.

Each of the above errors or omissions is discussed more fully in Appendix A.

3. City of Durham cost estimates for the Existing Development Rule – City of Durham staff developed estimates of its own costs for complying with the Existing Development rule, with some of the background data provided to NCDWQ at their request. The City has more than 400 BMPs and requirements for new development are adding approximately 60 new BMPs per year. The City provided funding through the NC Water Resources Research Institute that funded the cost studies by Wossink and Hunt that were used as a basis for cost estimates in the Fiscal Analysis. The City's cost estimates differ from those in Fiscal Analysis primarily in the following:
    a. Construction costs curves for new development reported in Wossink were adjusted using multipliers reported in the Urban Stormwater Retrofit Practices (CWP, August 2007.) The CWP manual compares the costs curve for new development reported by Wossink and based on comparative costs for retrofits that a multiplier of 1.5 be used for typical bioretention retrofits (page E-8), 2.3X for wet ponds (p. E-6), and 7X for stormwater wetlands (page E-6.) Sand filters are typically used only on constrained sites and CWP therefore suggests new development costs as appropriate for retrofits.
    b. Area requirements for retrofits were adjusted to include a maintenance easement around the BMP and to provide for heavy equipment to access the BMP for maintenance and eventual reconstruction, assuming a relatively optimal shape for the BMP. No allowance was made for constrained sites that require irregular BMP shapes that would increase area requirements.
    c. Estimated land costs were based on assessed tax value and recent sale price data provided in the GIS parcel database (maintained by Durham County) for parcels in the City of Durham that drain to Jordan Lake. Parcels that did not have a tax value were assigned an average value for the land use where one could be developed. Where opportunity costs were assumed to be zero in the Fiscal Analysis, in the City's estimates, street right-of-way was assigned the overall average value of land in the dataset in order to account for the opportunity cost of using the land for stormwater treatment, rather than lane expansion, transit, bikeways, etc.

d. For planning costs, primarily surveying and engineering design, used factors reported in CWP (2007) to account for the greater engineering complexity required to address site constraints: 35% of construction costs except that where retrofitting involves regulatory issues (e.g. stormwater wetlands), 40% of construction costs should be used.
e. Rather than use a 30 year implementation schedule, which would require accounting for reconstruction of BMPs after a 20-year life expectancy, the City's estimates are based on a 20-year implementation period in order to stay within the BMP life cycle.
f. The City used parcel data, parcel land use, watershed delineations and City boundaries to determine City developed land that drains to Jordan Lake. The rather high unit loading rates (pounds per acre per year) reported in the Jordan Lake watershed model were used to estimate existing load; this is largely irrelevant because we are looking for a percent reduction.
g. City costs do not include the costs to find the retrofit sites (perform a retrofit inventory, develop a concept design, assess project feasibility, rank potential retrofits, or negotiate purchase or easements.)

The spreadsheet model developed by City staff allowed evaluation of various mixes of BMPs, and allowed 'what-if' analysis for various mixes of BMPs. The model calculates loads and overall load percent reduction. Staff worked with the Planning Department to determine current City population in the Jordan Lake Watershed and also current household size so that the costs of the Existing Development rule could be expressed as a per household cost. Using City population in the Jordan Lake watershed is appropriate because the City of Durham is also faced with potentially more severe requirements to address Falls Lake – virtually all of the City drains to one or the other reservoir.

The estimated costs for retrofitting within the City of Durham to achieve a 35% reduction to Jordan Lake are summarized below for various mixes of BMPs.

Alternative Number	Assumed mix of BMPs	20 year total costs, incl. O&M	Average Cost per Household
1	Wetlands (92%)*	$349,600,000	$7,074
2	Wetlands (83%) +Buffers & level spreaders (13%)*	$333,600,000	$6,751
3	Wetlands (75%) +Bioretention (18%)*	$431,500,000	$8,732
4	Wetlands (67%) +Bioretention (26%)*	$467,300,000	$9,456
5	Bioretention (50%) + wetlands*	$572,500,000	$11,585
6	Bioretention w/ some wetlands downstream*	$680,500,000	$13,770

Total cost ranges from $333 million to $680 million, depending upon the BMP mix (see Appendix B for more information). As discussed above and in Appendix A, these costs take into account factors not included in the Fiscal Analysis.

The cost per household ranges from $6,750 to $13,800 (see Appendix C). These are enormous burdens for families, particularly given that a higher percentage of Durham's population is economically disadvantaged.

Costs are highly dependant upon the treatment option selected. Costs escalate rapidly for treatment options other than stormwater wetlands. The scenarios address widespread use of bioretention, as advocated by some citizens and NCDWQ staff to control nitrogen. Even modest use of bioretention increases costs substantially. Widespread use of bioretention nearly doubles the cost.

Certainly retrofitting is not the only way to reduce nitrogen from existing development. The Existing Development Rules allows local governments to consider and demonstrate the effectiveness of alternative means of reducing nitrogen loads from existing development. The rule lists some of the alternatives, such as increased street sweeping, requiring treatment of runoff in redevelopment projects, collection system improvements, removal of illegal discharges, and connection of onsite wastewater systems and discharging sand filter systems to central sewer. Cost and performance data on many of these alternatives are highly site specific, or they do not exist. Therefore it may be difficult to document effectiveness in feasibility studies.

4. Unit cost of retrofitting - The Fiscal Analysis estimates the 30-year costs to local government for the existing development rule to be $528,663,667 (FA, Chapter 5, Table 5.3). If the total cost is divided by 20 years to reflect BMP life expectancy, then the average annual cost would be $26,443,000. This cost achieves a lake-wide nitrogen load reduction of 410,634 pounds per year (FA, Chapter 5, Table 5.3). Dividing the cost per year by the pounds per year results in a unit cost of $64 per pound of nitrogen.

   The City's cost per pound of nitrogen is more than five times higher than those in the Fiscal Analysis. Cost estimates prepared by RTI this year, which appear to be based on new development costs and to exclude the cost of land, are more than double those in the Fiscal Analysis.

Source of Data For Estimate	**Assumed mix of BMPs**	**# of BMPs required, City of Durham**	**Unit costs, $/pound of nitrogen**
Jordan Lake FA		unknown	$64/ lb-N
RTI, June 2007	Wetlands only (Neuse)	unknown	$94.80/ lb-N
City of Durham Scenario 1	Wetlands (92%)*	1,570	$247/ lb-N

Source of Data For Estimate	Assumed mix of BMPs	# of BMPs required, City of Durham	Unit costs, $/pound of nitrogen
City of Durham Scenario 2	Wetlands (83%) +Buffers & level spreaders (13%)*	1,830	$235/ lb-N
City of Durham Scenario 3	Wetlands (75%) +Bioretention (18%)*	11,003	$305/ lb-N
City of Durham Scenario 4	Wetlands (67%) +Bioretention (26%)*	14,980	$330/ lb-N
City of Durham Scenario 5	Bioretention (50%) + wetlands*	27,370	$404/lb-N
City of Durham Scenario 6	Bioretention as primary BMP *	38,962	$480/ lb-N

Costs are highly dependant upon the treatment option selected. Costs escalate rapidly for treatment options other than stormwater wetlands.

5. Feasibility, part 1 – lack of sufficient qualified designers – There are a number of consulting firms in the area designing stormwater treatment for new development projects. In the City of Durham, new development is currently putting in about 60 stormwater treatment practices per year, Neuse & Cape Fear combined. Over the next four years the number of stormwater treatment systems required for new development is expected to more than double to 150 per year in order to address Phase II, Jordan Lake new development rule, and a similar new development rule for Falls Lake pursuant to the schedule in the Drinking Water Reservoir Act, S.L. 2005-190 (as amended). Of the stormwater treatment options available, stormwater wetlands result in the fewest number of retrofit systems. Based on a 20 year roll-out, an additional 80 stormwater wetlands per year would be required. Between new development and retrofitting 230 BMPs would be required, an increase of over 3.5 times. Neighboring communities will also see increase in demand for qualified engineers. Because of the greater complexity of retrofits, they will require engineers with the greatest experience. As a result, costs for design and engineering are likely to escalate beyond those assumed in our analysis, even if stormwater wetlands are the core of the retrofitting program. The use of stormwater wetlands as the core of a retrofit program is not likely given the urban nature of the City of Durham.

   If bioretention is used for even a small fraction of the load, the numbers of BMPs required jumps by orders of magnitude. At the extreme, if bioretention cells (with under-drain systems required by our Triassic Basin clay soils) will be used for most of the retrofitting, then the City would need to be able to develop designs for 1,948 bioretention cells per year just for retrofits, compared to the 60 BMPs being designed and built currently.

6. Feasibility, part 2 - restoring riparian buffers to treat stormwater runoff – Forested riparian buffers are an effective means of protecting water quality and removing nitrogen and other

pollutants that are in sheet-flow runoff and shallow groundwater. Once stormwater sheet-flow runoff begins to concentrate in channels, the water rushes through too quickly, largely by-passing the filtration and infiltration benefits of buffers. Neuse buffer regulations require that all concentrated flows either be treated to achieve at least 30% reduction in nitrogen, or be returned to sheet-flow using level spreaders. To use level spreaders in new development, pipe systems are designed to daylight (reach the surface) outside the buffer. However, existing development invariably has existing stormwater piping systems that pass underneath where buffers would be established, discharging more or less directly to streams and other surface waters.

In many cases it may be possible to re-establish forested buffers in existing developments by acquiring land or easements along streams and then planting trees. Such buffers would have water quality benefits, but they would provide little treatment of stormwater where existing piped systems discharge directly to streams. For buffers to be effective in removing nitrogen from stormwater runoff, it will be necessary to rebuild large portions of existing stormwater pipe networks, providing the outfall pipe with a new slope and size in order that the discharge occurs outside the buffer, where the flow could enter a level spreader. The costs of reconstructing stormwater piping systems are site specific and difficult to estimate, but when they are taken into account, they will increase the cost and complexity of this option. In short, while re-establishing woody buffers along streams is desirable because of other water quality benefits, it is likely to be difficult and expensive to implement buffer restoration in a way that results in effective treatment of stormwater runoff from existing development.

7. Feasibility, part 3 –Stormwater Wetlands Regulatory Issues - Stormwater wetlands are far-and-away the most cost effective treatment option, and far fewer of them would be needed than for any other treatment option. The lower number of wetland systems required will facilitate keeping up with maintenance. The greater visibility of larger individual BMPs is more likely to enlist citizen support for maintenance. However, to assume that stormwater wetlands will be appropriate as retrofits to treat stormwater runoff from most existing development must be questioned. For example, stormwater wetlands require more land area than other treatment options. Dr. William F. Hunt has developed construction cost estimates for stormwater wetlands based on the typical case where they are installed with only surface grading rather than extensive excavation. Wetland plants require water. In the usual case stormwater wetlands are placed where water is available, either because of high water table, or because the contributing area is sufficiently large to provide frequent flow. In the latter case, the stormwater wetlands would be located on an intermittent or perennial stream at a point where the drainage area is in the range of 30 to 50 acres and will require 2 to 3.5 acres of land. In many cases, existing development already occupies the ideal location, and it may be necessary to go further downstream to find sufficient available open area. However, current EPA Region 4 prohibitions on in-stream structures are likely to preclude implementation of stormwater wetlands at such locations. This prohibition would need to be revised in order for wetlands to be feasible for more than a small portion of the treatment requirements. NCDWQ should revise the fiscal analysis so that stormwater wetlands are not

the basis of the Fiscal Analysis or else explicitly acknowledge in the rules the necessity of putting stormwater treatment further downstream when land is not available upstream.

The City of Durham has estimated that if wetlands are used for virtually all of the retrofit treatment systems (accounting for 92% of the load reduction), then "only" 1,112 treatment facilities would be required. That is a huge number requiring a large staff just to inspect them on a quarterly basis, to say nothing of maintenance.

8. Feasibility, part 4 - Bioretention to retrofit existing development – Bioretention is capable of being located in fairly small places and more efficient and cost-effective than other available alternatives for tight places. However, the clay soils found in watershed draining to the Upper New Hope Arm of the lake require that such systems have engineered soils and an underdrain in order to work properly. State guidance calls for bioretention cells to be four feet deep. Finding locations where the underdrain can be connected to an existing system of storm drain pipes or day-lighted to surface drainage will be problematic.

   Even more problematic is that the number of bioretention cells required is unreasonably large, resulting in an unreasonable number of BMPs. Not only would the number overwhelm existing design capacity, it would also require an army of maintenance workers to re-supply mulch, thin overgrown cells, replace dead plants, dig out bioretention cells that may become clogged by clay sediment, cleaning out a clogged underdrain, etc. The number of bioretention systems required is staggering.

9. Equal application to development - Equity requires that all local governments in the watershed address stormwater runoff from developed lands. Controls will include land use controls, source identification and reduction, and construction of stormwater treatment devices necessary to contribute to the reductions needed. Equity indicates that a shopping center should have to achieve the same level of reduction regardless of what jurisdiction it is located. There are shopping centers not located within municipal boundaries. Industries are frequently located outside of municipal boundaries such as Research Triangle Park. Equalizing reduction goals will result in costs being shared more or less equally, and the rules must not tend to provide incentives for businesses to relocate within the watershed. A policy mistake in this area would contravene the many efforts made in recent years to promote "smart growth" principles and would lead to accelerated sprawl in rural areas. NCDWQ has drafted two different methods of allocating load, neither of which fully complies with the foregoing. An early draft of the rules allocated nonpoint source reductions based on each jurisdiction achieving "unit area loading" which would have required impossible reductions for towns and cities (on the order of 60 to 70% reductions) while largely exempting counties. The current draft rules require each jurisdiction to achieve a 35% reduction from all land, not just developed land, which has created inequities in the opposite direction such that largely undeveloped counties that are largely forested will have difficulty finding reductions from existing development. The rules should have followed the path provided in the 1999 "TMDL for Total Nitrogen to the Neuse River Estuary" for allocating loads:

> *Commentors (sic) indicated that reductions could not be made from forested land. Therefore, the nitrogen from this land use was considered as background in the final allocation. The 30% reduction that would be needed from forested land was allocated among agriculture and urban land in proportion to their respective land areas within the basin.* (See Appendix D, highlighted text for context.)

To achieve equity, the load reductions must be based on developed land. Assuming forestry is not given a reduction goal, then to achieve equity between point sources, agriculture and urban stormwater, the load from forestry should have been explicitly separated as background in the TMDL, and the remaining management categories should have the same percent reduction. Making such a calculation an explicit part of the TMDL would have simplified allocation.

10. Inequity in the way the forestry exemption is applied – In the load allocations, forestry was considered a source of pollution (rather than background.) However, in the rules, forestry was not required to make reductions. The result is inequities in the allocations between point sources and nonpoint sources. While wastewater treatment plants have a clear goal to reduce nitrogen in effluent by 35% in the UNHA, development and agriculture will have to reduce nitrogen loads a much greater percentage (close to 55%) in order to make up for the free pass being given to forestry. If there are valid reasons for exempting forestry, then forestry should be considered background before allocations are made to all the sources required to reduce loads.

11. Inequity between wastewater effluent goals and stormwater - The concentration of nitrogen in stormwater runoff BEFORE treatment generally ranges from 1.2 mg/L to about 2.6 mg/L (See Appendix E.) If we assume that the existing development rule eventually leads to treatment of stormwater runoff, then the rules imply that concentrations of nitrogen in stormwater in the range of 1 to 3 mg/l are too high. It is widely recognized that the lower the concentration, the more difficult it is to remove a pollutant.

    Concentrations of total nitrogen in untreated stormwater are less than the effluent concentration that wastewater treatment facilities will be required to meet, where 3.0 mg/L is considered the limits of technology for biological nutrient removal (BNR.) 3.0 mg/l is the effluent concentration that was used to allocate load between wastewater dischargers at their permitted discharge limits, and the rules specify 3.0 mg/L nitrogen as the effluent limit for new and expanding discharges (15A NCAC 02B .0270).

    It is not clear why 3.0 mg/l is considered the “limits of technology” for wastewater when stormwater is being mandated to remove nitrogen at much lower concentrations using limited technology (passive treatment) such as stormwater wetlands, wet ponds, sand filters and bioretention cells.

Given the foregoing discussions of technical feasibility, equity and cost, the Existing Development Rule requires substantial revision.

The City of Durham strongly recommends that the Fiscal Analysis be revised to reflect the higher cost of retrofitting compared to constructing BMPs integral to land development projects, and the opportunity cost of land that has not assigned tax value, and that based on the excessive costs, that the existing development rule be modified to include the following:

> *Local governments are expected to evaluate the feasibility and cost of reductions from developed parcels that those governments own. Local governments will implement retrofits and other load reducing measures on other properties as grant funding or other funding is available to fully fund the planning, design and construction of those retrofits or other load reducing measures.*

15A NCAC 02B .0262, Watershed Nutrient Reduction Goal

1. Rules not consistent with strategy 15A NCAC 02B .0262(1) lists the strategy goal as ". . . *reducing the average annual loads of nitrogen and phosphorus delivered to Jordan Reservoir from all point and nonpoint sources of these nutrients located within its watershed.*" The proposed rules do not establish reduction requirements applicable to forestry. Forestry exerts a significant load on the lake in all three segments of the lake. Forestry might be exempted if it were classified as "background" rather than a pollutant source, but in that case the reduction goals for the remaining sources would have to be recalculated by:

   Allowable Load = BKG + (1- %Reduction) x [Ex. Point load + Ex. Development Stormwater Load + Ex. Agricultural Load]
   Where BKG = background from forested land
   Ex. means "Existing" during the baseline period, 1997-2001

2. Legal authorities and blurring of responsibilities – The rules rely on state water supply watershed authorities that have long been applied to counties as well as municipalities. The City is concerned that the use of state authorities, rather than the federal Clean Water Act, will lead to ambiguities and uncertainties, and will blur local responsibilities. The use of state authorities can be construed as expanding the scope of the Clean Water Act in unpredictable ways. Furthermore, it is not clear that the enabling legislation can be interpreted so broadly.

3. Adaptive management - We applaud the inclusion of adaptive management in the rule at 15A NCAC 02B .0262(7). The Jordan Lake watershed model used pollutant loading rates that are much higher than the loadings found in monitoring by Phase I municipal permittees (including the City of Durham) in North Carolina. Such high loading rates were necessary to

match estimated load to the lake. It may be that better data will show that loads to the lake have been overestimated, or that developed area was underestimated in the watershed model. Adaptive management provides an opportunity to make mid-course corrections, allowing adjustment of both goals and methods of attaining those goals.
However, it is not clear how the five year period in the rule will be applied, and how it will integrate with the basin planning process that is now planned to have more frequent up-dates to coincide with two-year cycle for the Integrated Report (303d list of impaired waters.) Changes in basin planning should be considered before the rule text is adopted.

4. Atmospheric Deposition acknowledged but not addressed - The rules are not consistent with the Strategy of addressing "*all point and nonpoint sources of these nutrients located within its watershed"* by failing to address atmospheric deposition. However, we do appreciate the reference to atmospheric deposition in 15A NCAC 02B .0262(8) as a source of nitrogen in the watershed and the explicit acknowledgement that the rules do not address this source. In previous comments we have cited publications (NRC 2002, McMahon, 2002, and Howarth, 2006) that provide various different lines of evidence indicating that atmospheric deposition to the watershed may be the largest single source of nitrogen in nitrogen impaired waters, not only in the Northeastern US, but more locally within the Neuse and Tar-Pam River Basins. Sources of atmospheric nitrogen include transportation, power generation and agriculture. Year 2000 NOx emissions were estimated to be 474 tons per day in the Triangle; when non-oxidized forms of nitrogen (e.g. ammonia) are considered, total emissions of reactive nitrogen are much higher. Current generation catalytic converters tend to convert some of the NOx to ammonia. Yet, better technology exists: both General Motors and Honda Motors having separately announced development of advance catalytic converters that convert ammonia into inert nitrogen gas (N_2).

5. No clear provision for new municipalities - While the rule indicates that reduction goals shall apply to all incorporated municipalities within the Jordan watershed, the rule goes on to list the municipalities to which it applies. The language should be amended to clarify that newly incorporated municipalities within the Jordan Lake watershed, and municipalities that annex property within the Jordan Lake watershed become subject to the rule.

15A NCAC 02B .0263 – Nutrient Management

No specific comments on this rule.

15A NCAC 02B .0264 – Agriculture

1. BMPs to be implemented - The statement that "implementation may have occurred at any time before, during, or after the baseline period." This is different than the Stormwater Management Existing Development rule at 02B.0266(3)(a)(iii) which calls for identifying "specific load-reducing practices implemented to date subsequent to the baseline period". The wide latitude as to when implementation may occur lessens the probability that agriculture will achieve any reductions, undermining the nonpoint source nutrient reduction strategy as a whole. Such loose provisions are not consistent with the Purpose Rule 15A NCAC 02B.0262 (1). Furthermore, agricultural sources are allowed to generate nitrogen

credits by implementing any BMP in addition to the list provided in .0264 (7) (a). This is likely to generate nitrogen credits that bear no relationship to actual reduction after the baseline period or to the nutrient reduction targets. The generation and transfer of spurious credits will further undermine the nonpoint source nutrient reduction strategy. Failure of the strategy would leave point and non-point permittees vulnerable to further reductions in the future.

15A NCAC 02B .0265 – Stormwater Management for New Development

1. Use of offset payments – Offset payments that are collected in one sub-watershed should be spent on projects within that sub-watershed, and ideally within the jurisdiction from which it was collected.

2. Expansion of BMP toolbox - NCDWQ has been extremely conservative as to the "tools" approved to address stormwater runoff and as to the removal efficiencies allowed those 'tools.' The new Stormwater Best Management Practices Manual has included additional stormwater practices, but continues to be conservative as to removal efficiencies. Bioretention is considered to remove 40% of nitrogen although recent studies by Hunt show that bioretention reduces stormwater volume by about 30% even on clay soils (Hunt, 2004) and reduces nitrogen by 50 to 60%. No nitrogen removal is afforded for cisterns even where the rainwater is used for irrigation and is not discharged.

3. Research Needed - NCDWQ must assist local governments in funding research to advance the state-of-the-art and improve the effectiveness and efficiency of stormwater treatment Best Management Practices at removing nitrogen and phosphorous. This is probably more critical for addressing existing development, but it would benefit new development as well.

4. Implementation Schedule - The implementation schedule requires that local governments submit their stormwater management programs within six months of the Commission's approval of a Model Program, but gives the Division nine months to review the local programs and submit them to the Commission. This schedule is not realistic and should be 12 months each. Local governments should be given the same length of time to develop their programs as the Division expects to take to review them.

5. Local staff requirements - The fiscal analysis makes the assumption (FA Chapter 4, p.43) that because "almost all municipalities in the watershed are subject to Phase II requirements and are to implement new development programs beginning mid- to late 2007," and because "virtually all remaining municipalities fall within water supply watersheds and implement WSW stormwater programs," that Jordan municipalities will not incur "significant, quantifiable additional costs to implement this rule." This assertion is baseless. The City of Durham expects the nutrient reduction requirements to result in at least twice as many BMPs as the Phase II requirements and water supply watershed requirements, and to require significant staff time to make "stream calls" to interpret application of the Jordan buffer rules to development projects. BMPs will be required at lower development thresholds than for the other two programs, and for more intensively developed projects, a treatment train of at

least two BMPs will be required, requiring twice the review time. Local governments will need new resources to address the nutrient reduction requirements. The City of Durham currently employees four (4) engineers for the review, certification and acceptance of BMPs for implementation of Neuse Rules, Water Supply Watershed Rules and peak flow requirements. Additional staff is employed to oversee the continued operation and maintenance of these facilities and ensure owner compliance. Doubling the number of BMPs required in the Cape Fear basin for new development will significantly increase work load in these areas. Two additional engineers will be needed for new development requirements of the Jordan rules as well as additional support staff. The fiscal analysis should be revised to reflect facts on the ground.

6. Counties and ETJs - The fiscal analysis states that "much new development activity is likely to fall within municipalities' planning jurisdictions. Thus, counties should not incur significant additional costs to implement this rule" (FA Chapter 4, p.43). This appears to refer to an Extra Territorial Jurisdiction or ETJ. The City of Durham does not have an ETJ. Furthermore, in the upper part of the lake much growth appears to be occurring in Chatham County outside any ETJ.

7. Ordinance preparation - The pay rate of $36/hour (FA Chapter 4, p.44) used to quantify the cost of local governments contracting assistance in preparing ordinances is absurdly low. Attorneys and consultants qualified to assist in this arena bill upwards of $200/hour.

15A NCAC 02B.0267 - PROTECTION OF EXISTING RIPARIAN BUFFERS

The City of Durham adopted an ordinance protecting riparian buffers city-wide on perennial and intermittent streams well before becoming subject Neuse regulations. The proposed buffer rules for Jordan Lake are far more complex and proscriptive and will require significant additional staff time to implement.

1. Digital stream maps - The state currently does not accept the use of digital maps for determining whether a stream may be present. The use of illegible paper maps is likely to lead to errors.
   a) The State of North Carolina should continue to implement protection of riparian buffers for Jordan Lake, as it does in the much larger Neuse River Basin, until such time as the state has adequate digital maps of perennial and intermittent streams; or,
   b) Where a local government has current 2-foot topography from which accurate local maps of streams have been made, the local government should be allowed to transfer USGS and Soil Survey perennial and intermittent stream status to the spatially accurate local stream map for use in determining whether a buffer is required.

   Use of digital maps will allow the required buffer to be shown more accurately on plans, and their location to be more easily verified by review staff.

2 Appeal process for "stream calls" - The rules require appeals to be handled locally when there is dispute between a developer and the local review staff regarding whether a stream is present. Such a process may become politicized - the State of North Carolina will have to accept the results, whatever they may be.

The City of Durham has demonstrated both commitment and leadership in protecting water quality. The City provided biological nutrient removal at the South Durham plant prior to passage of the Clean Water Responsibility Act (HB515.) The City adopted city-wide riparian buffers prior to passage of Neuse buffer requirements. The City prohibited most development in floodplains prior to state proposals for a Universal Stormwater Management program.

However, the City is extremely concerned about equity, feasibility, and attainability under the draft Jordan Lake nonpoint source rules, particularly with respect to existing development and other sources, such as forestry and agriculture.

Despite efforts to portray the lake as imperiled, nitrogen loading to the Upper New Hope Arm has been declining. A Division of Water Quality study (see excerpts in Appendix F) shows that nitrogen loads to Jordan Lake from New Hope Creek have been declining (DWQ, October 15, 2004.) The decline in nitrogen loading from 1990 to 2004 was statistically significant in New Hope Creek, despite development occurring in three municipalities (Durham, Chapel Hill, and Carrboro) and two counties (Durham and Orange). Similar declines in nutrient have been reported in a study by USGS (see excerpts in Appendix G) in the Haw River at Bynum (USGS, 2005) where nitrogen and phosphorous loads and concentrations have declined.

Since completion of those studies two major wastewater dischargers in the Upper New Hope Arm, Durham County and Orange Water and Sewer Authority (OWASA) have completed major upgrades to meet the anticipated Jordan Lake requirements. These improvements will result in further decreases in nitrogen and phosphorus loadings to the upper New Hope Arm of Jordan Lake from Northeast Creek and Morgan Creek.

Recreational and water supply uses are already being realized. Water quality in Jordan Lake is better than it was predicted to be before it was built, and loads to the lake have been declining and will continue to decline. The lake is not in decline!

The cost of achieving a 35% reduction from existing development in the City of Durham is estimated to be $334 million, or approximately $6,750 per family. This would make stormwater retrofits on existing development the single largest debt financed public improvement in the City's history. And these costs are only for Jordan Lake. The City faces similar reduction requirements for Falls Lake, and will be similarly expensive.

Over the entire Jordan Lake watershed the Existing Development Rule is likely to cost $2 billion dollars based only on nitrogen reductions, based on the City's lowest cost estimate for retrofitting at $247 per pound of nitrogen, and the lake-wide nitrogen load reduction of 410,634 pounds per year (FA, Chapter 5, Table 5.3). These costs consider only the cost of treatment and do not account for loss of tax revenue. Two billion dollars is an unprecedented cost for a single locally-funded environmental program in North Carolina.

The City faces additional costs to implement new development and buffer rules, and to upgrade its South Durham Treatment Plant despite having previously upgraded that facility to meet the requirements of HB515 (Clean Water Responsibility Act.)

Should the Environmental Management Commission and the NC General Assembly choose to implement these rules, the state must provide financial and technical assistance to local governments. Local governments throughout the watershed will bear significant costs in implementing these rules, yet most of the local governments and their citizens do not benefit directly from Jordan Lake. The disparity between who pays and who benefits provides a clear role for state government. Unless the rules are rewritten, grant programs are free to refuse funding on the basis that retrofitting is already "required." The NC General Assembly will have to appropriate funds from the general budget specifically for implementing the Jordan Lake nutrient rules, or dedicate a stream of revenue specifically for that purpose. The General Assembly should commit to building a fund for Jordan Lake nutrient management and contribute at least $150 Million per year to the fund over the first ten years of implementing the Jordan Lake nutrient rules.

The rules should be rewritten. If they are not, and if funding is not identified, then ultimately, when the feasibility analyses have been completed, and most communities have found that nutrient reduction targets for existing development cannot be achieved due to technical, economic, administrative and legal constraints, then the Environmental Management Commission and the Division of Water Quality will have to undertake a Use Attainability Analysis to establish locally appropriate standards for Jordan Lake.

Sincerely,

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