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August 16, 2010

Mr. John Huisman
Nonpoint Source Management Program
NCDENR: Division of Water Quality - Planning Section
1617 Mail Service Center
Raleigh, NC 27699-1617

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

SUBJECT: Comments on Draft Falls Lake Nutrient Sensitive Waters Strategy Rules

Dear Mr. Huisman and Commissioners:

The City of Durham appreciates this opportunity to submit written comments on the draft Falls Lake Nutrient Sensitive Waters Rules. The City of Durham has been proactive in protecting Falls Lake, including buffer protections for intermittent and perennial streams that pre-date Neuse rules, buffer protections for jurisdictional wetlands not required under state rules, water supply watershed requirements beginning in 1985, Neuse post-construction nitrogen export limits in 2002, and stormwater treatment requirements for redevelopment. Effective this past June, the City reduced the nitrogen export limit to 2.2 pounds per acre per year as proposed in the draft Falls Lake rules and added new phosphorous export limits citywide. The City is implementing a model program it developed for certifying construction and annual inspection of stormwater treatment practices. The City's very active Stormwater Management program funds regular vacuum street sweeping, identification and elimination of illicit discharges, public education and involvement, mass media campaigns, industrial inspections, system inspection and preventative maintenance, capital improvements, stream monitoring, watershed planning, GIS mapping, stream flow measurement, USGS gaging stations, staff training, and funding of demonstration projects. The City has mapped more than 500 stormwater treatment practices, and has worked with partners to restore more than 17,000 linear feet of stream.

Durham is in a unique position on a ridge line between Falls and Jordan Lakes. Both lakes were built more than 100 years after the establishment of the City of Durham and both lakes now require hundreds of millions of dollars to fix a nutrient problem that state regulators would not acknowledge when these projects were considered by the Army Corps of Engineers 40 years ago. It is somewhat dismaying that the Falls Lake rules now mandate a massive effort to reduce nutrient loads to the lake when the original Army Corps of Engineers documents (published before the lake was built) indicated that algae productivity would be an issue for the upper part of Falls Lake. A similar finding was made for Jordan Lake where predictions were made that the chlorophyll *a* standard would be exceeded before the lake was built. In light of this oversight, the state should consider evaluating the applicability of the chlorophyll *a* water quality standard in both of these lakes, particularly in the upper reaches of these lakes.

The draft Falls Lake rules would subject Falls Lake watershed local governments to the most stringent target reductions in the state and the eastern seaboard. Using locally generated information for three of the City's sub-watersheds in the Falls Lake watershed, the City has estimated capital costs to retrofit existing development at \$645 million. This could translate into homeowner stormwater fees on the order of \$400 annually and a Durham County Schools storm water fee of greater than \$1 million annually. Amazingly, this expenditure would not result in meeting the proposed nitrogen and phosphorus targets for Falls Lake.

Certainly controls are needed to keep nutrient loads from increasing and to protect the City of Raleigh's water supply. To that end, Durham supports the Consensus Principles developed in cooperation with other local governments. However, the feasibility of meeting the Stage II target nutrient loads is tenuous at best and incredibly costly. The Jordan Lake rules were modified by the General Assembly to provide a more reasonable approach to existing development. The Falls Lake rules still do not contain a similar approach after several rounds of discussion with Durham and other stakeholders. These conditions or protections need to be included in a satisfactory manner, as described in the Joint Attorney Rule Revisions (see attachments). The scientific basis of the Stage II targets also must be re-evaluated. The City of Durham has provided comments and questions regarding the use of the DWQ calibrated nutrient response model to develop reduction curves for lake management. These comments and questions have generally been dismissed using a blanket of conservative assumptions. The Stage II targets must be re-evaluated using a longer period of environmental data collected to meet those needs identified by DWQ in their 2005 study plan, as well as stakeholder needs to reduce the large uncertainty in predicting lake response to changes in the watershed.

Even given these daunting financial figures, Durham is not requesting the state delay the Falls Lake nutrient management strategy. Rather, Durham requests that language provided by the Joint Attorney Rule Revisions be incorporated into the final rule package to be adopted in January 2010. Detailed comments and other documents are attached.

Durham appreciates the opportunity to participate in the Falls Lake rulemaking and is committed to protecting the use of Falls Lake as a drinking water supply. Our Stormwater Services Division continues to grow and take on other challenges, such as Low Impact Development suitable for our soils and implementation of Total Maximum Daily Loads. We look forward to continued cooperation on water quality issues. Stormwater Services staff members Paul Wiebke (919.560.4326 ext 30239) and John Cox (ext. 30212) are available to discuss any of these comments with you at your convenience. Please contact them if you have any questions.

Sincerely,



Theodore L. Voorhees
Deputy City Manager and
Acting Public Works Director

cc: Thomas J. Bonfield, City Manager
Vicki Westbrook, Assistant Director, Department of Water Management
Ed Venable, Engineering and Stormwater Manager, Department of Public Works
Paul Wiebke, Assistant Stormwater Manager, Department of Public Works
John Cox, Water Quality Manager, Department of Public Works

Attachments

Appendices

- A. Public Comments Requested By the Environmental Management Commission
- B. Comments on Goals Rule
- C. Discussion of Fiscal Analysis For the Proposed Nutrient Strategy for Falls of The Neuse Reservoir
- D. Falls Lake Impervious Surface Study, City of Durham Public Works, Stormwater Services, 2010
- E. Falls Lake Misconceptions
- F. Memorandum: Preliminary Comments on the Falls Lake Nutrient Management Strategy and Total Maximum Daily Load (TMDL) Target Setting, addressed to Katy Stecker March 30, 2009

The Joint Attorney Rule Revisions, to be sent separately, are incorporated by reference. Previous written and oral comments also are incorporated by reference.

The following documents were submitted previously and have been posted to the Division of Water Quality's Falls Lake web page:

1. Memorandum: Falls Lake Existing Development Fiscal Analysis, May 24, 2010.
2. Executive Summary, Ellerbe Creek Watershed Management Improvement Plan (revised April, 2010)
3. Memorandum: Falls Lake Nutrient Response Model Reduction Curves, Tetra Tech, June 29, 2010, revised July 2, 2010.

APPENDIX A

Public Comments Requested By the Environmental Management Commission

Time Frame for Stage 1 (.0275)

The proposed rule calls for full implementation under Stage I by 2021 in order to allow for capacity building and implementation by local governments. The Commission has asked for comments regarding an alternative time frame of seven years.

All local governments will need to undertake capacity-building to achieve the mandated Stage I reductions. Evaluation of an appropriate time frame must be based in part on local government's existing capabilities and capacity, and in part on the reductions needed. Seven years imposes an unachievable burden and must be rejected.

The argument put forth for a shorter time frame is (paraphrased):

Local government created the additional load of Stage I over three or four years and should be able to remediate the increase in an equivalent time frame.

Local governments approved these projects, but they did not hire the grading contractors, the road builders or the contractors building the homes and shopping centers. To the extent that there has been an increase in load, the increase was the result of private sector initiative, private sector funding, private sector capital-risk, private sector know-how, private sector construction equipment, etc.

To be sure, private sector design firms and contractors will play a key role in completing projects under Stage I. However, Durham and other local governments must build capacity before effective engagement of the private sector is possible.

No local government in the watershed currently operates a formal retrofit program. No local government in the watershed currently has funding available for retrofitting beyond smaller demonstration projects. No local government in the watershed has sufficient engineering, paralegal or support staff to implement a formal retrofit program.

In recognition of the cost and difficulty of retrofitting, Durham City Council amended the post-construction ordinance to revise the nitrogen export limit downward from 3.6 pounds per acre per year (Neuse NSW Strategy) to 2.2 pounds per acre per year, and added an interim phosphorous export limit. These changes have been made to minimize the amount of retrofitting going forward in order to give the City sufficient breathing room to develop a retrofit program.

The Fiscal Analysis references "*the level of preparedness and implementation shown by Durham and others*" and "*the pro-active nature of these local governments, which includes*

Durham having completed watershed restoration planning for at least two of its Falls watersheds.”

The City of Durham is justly proud of its stormwater program but is aware of its limitations as well as its accomplishments and capabilities. The City has completed one watershed plan in the Falls watershed and has participated in the Upper Neuse River Basin Association's efforts to develop two other such plans.

The watershed planning completed to date is only a beginning. Durham spans two river basins. The City also faces challenges related to water quality exceedances in two major drinking water reservoirs, Jordan Lake and Falls Lake. The City's Phase I stormwater permit requires Durham to develop Water Quality Improvement Plans for local impairment. The City will be developing four to six additional watershed plans, each of which require two years or more to complete. Each plan requires significant staff resources, and watershed planning will be an ongoing activity through 2021.

Watershed plans identify retrofit projects. However, the City has not developed a formal retrofit program. Projects completed to date have generally been completed when grants become available, or where willing partners have come forward. Projects funded by the City have been small demonstration projects. The City will need to identify additional funding, and will need to hire additional engineering staff resources in order to achieve the Stage I goals by 2021.

Our calculations currently indicate that existing development retrofits for Stage I will cost approximately \$45 million to implement. Revenues from the City's stormwater utility are estimated to be \$9.8 million for FY 2011. The expense of retrofitting is clearly large compared to existing resources, which are dedicated to existing programs and requirements.

A deadline of 2018 would require precipitous increases in stormwater utility rates or property taxes. The initially proposed deadline of 2021 would provide additional time for capacity building and incremental annual growth. Incremental rate increases allow time for commercial and residential property owners to pass along increased costs to tenants. Incremental rate increases allow time for people living on fixed incomes to make adjustments in their lives. Incremental rate increases will allow the Durham Stormwater Management to build capacity by adding staff and supervisory capabilities gradually.

One should not underestimate the difficulty of imposing new fees on City residents, and requesting (and hopefully receiving) as much state or possibly federal funding as possible for this endeavor cannot be underestimated. In addition, the process of implementing existing development retrofits includes land acquisition, project design, permitting, and construction. All of these tasks can occur only after securing funds for the projects. It is debatable whether ten years is sufficient for this task, but seven years is clearly inadequate.

Re-Evaluation of Stage II Goals Prior To Implementation (.0275)

The Commission seeks public comment on the following option: that prior to setting Stage II limits that the results of Stage I be reviewed and an opportunity for establishing Stage II results or numbers be considered at the end of Stage I.

The City of Durham has consistently sought changes in the rule text regarding re-examination of the Stage II goals before they are implemented. New data is currently being generated by researchers at NCSU, USDA, NC Division of Forest Resources, Wake County, the Cities of Durham and Raleigh, and others. The City has been working with other local governments to bring the rules more in line with the Consensus Principles agreed to by nearly all local governments in the watershed, and will be submitting proposed rule text that has been agreed to by attorneys representing the City of Raleigh, Granville County, and South Granville Water and Sewer Authority.

The City feels very strongly that Stage II should not go into effect until a re-evaluation has been completed. We believe that this re-evaluation can be scheduled and take place during the implementation of Stage I, and need not require a pause in implementation of retrofits or other load reducing programs.

Land Disturbance Threshold (.0277)

Options A: Approved stormwater management plan required for proposed new developments with land disturbance of one acre or more for single family and duplex development, and one-half acre or more for commercial, industrial, institutional, and multi-family development.

Option B: Approved stormwater management plan required for proposed new developments with land disturbance of 5,000 square feet or more.

Nearly all residential development is picked up under Option A; land exceeding the thresholds that is subdivided is considered part of a plan of common development. Cumulative land disturbance over time that exceeds the thresholds also triggers requirements under Option A. Reducing the land disturbance threshold to 5,000 square feet applies requirements to a large number of project sites that - because they have very small footprints - have a small cumulative impact. Many of these are infill projects that are supported by mass transit and have less cumulative environmental impact in general. We question the benefits particularly with regard to single family development.

The City has compiled a spreadsheet of all development plans approved in the Neuse River Basin after the baseline year in order to estimate load to be mitigated under Stage I. The list includes projects under ½ acre as well as any projects that might have been exempt as vested. Of the 122 projects approved in the Neuse Basin, 101 are in the Falls Lake watershed. For the 101 projects in the Falls Basin, only 17% of the disturbed area was on projects that were below the threshold and therefore exempt from Neuse requirements.

Furthermore, the average post construction nitrogen load for all 101 projects - including those exempt - was well below 3.6 pounds per acre per year. In short, the overall load met

Neuse loading limits even when nitrogen load from exempted projects is included. The projects that are exempt did not appreciably increase nitrogen load.

Lowering the threshold to 5,000 square feet will substantially increase demands on existing development review staff. Demands will be most acute if the threshold is reduced for residential development, where it will apply to individual families building homes that are lots of record with vested rights. If applicable loading limits require two BMPs in series, some infill sites may become undevelopable, triggering a “takings.”

A compromise position would be to lower the threshold only on commercial, industrial, institutional, and multi-family development, which has higher impervious cover than single family and duplex development. An erosion and sediment control plan is now required for 12,000 square feet of land disturbance, making this a more suitable benchmark for commercial land disturbance.

We therefore recommend the following compromise position:

Option C: Approved stormwater management plan required for proposed new developments with land disturbance of one acre or more for single family and duplex development, and 12,000 square feet or more for commercial, industrial, institutional, and multi-family development.

If a lower threshold is somehow still deemed necessary for residential development than a reduction to a one-half acre disturbance would be less disruptive and wasteful of staff resources than would lower thresholds.

Onsite Treatment Options (.0277)

Option A: 50% N / 60% P

Option B: 60% N / 60% P

The approach of requiring a minimum amount of treatment onsite is different than the threshold approach used for the Neuse, Tar-Pam and Jordan. The City of Durham first began requiring a minimum on-site treatment but at 40%, which is considerably lower than is proposed here.

In stakeholder meetings, Division staff indicated that the intent was to require no more than two BMPs in series. Studies have found that BMPs produce fairly consistent effluent concentration, sometimes call an “irreducible concentration.” For BMPs in series, the first BMP produces virtually all of the reduction in nutrient concentration. The second BMP may provide additional volume and peak flow mitigation, but has little impact on nutrient concentration.

In stakeholder meetings City staff previous indicated that achieving a 50% reduction in nitrogen onsite would be difficult using two BMPs under approved calculation methods and BMP percent reductions describer in Table 4-1 of the NC Division of Water Quality Stormwater Best Management Practices Manual. At the time, City staff was looking forward

to the forthcoming Jordan Lake Accounting tool that was expected to be more accurate, include more BMPs and possibly show how developers could make more nutrient reductions onsite.

City development review engineers used the public release Beta version of the Jordan Accounting Tool to evaluate a range of development scenarios, assuming 100% capture of all runoff, which is typically not achieved in practice for treatment with one BMP, much less two in series. Under this fairly optimistic set of assumptions, and using the two BMPs found to be the most effective at controlling nitrogen, the tool indicates that when two BMPs are required in series, it is not possible to achieve a 50% reduction in nitrogen loading rate over the applicable range of impervious cover.

A 50% reduction in nitrogen loading rate is *not possible* using two BMPs in series regardless of development intensity. In contrast a 60% reduction in phosphorous loading rate is *possible* using two BMPs in series over the range of expected development intensities.

The Beta Jordan Accounting tool indicates nitrogen and phosphorous loading limits can be met onsite using one BMP for development between 5% impervious cover and 18% impervious cover. If a second BMP is added in series, then both nitrogen and phosphorous loading limits can be met onsite for development to about 25% impervious cover.

Above 25% impervious cover it is necessary to use two BMPs together with offsite mitigation in order to achieve the needed load reductions. Unfortunately, however, two BMPs in series do not achieve 50% reduction in loading rate for any combination of development intensities. This would effectively prohibit development over 25% impervious cover.

In exploring further, we looked at the needed load reduction, which is the post-construction load minus the loading limit, 2.2 pounds per acre per year. Two BMPs in series are capable of achieving 50% of the needed load reduction onsite.

Option A should be re-worded as follows:

“The developer shall have the option of offsetting part of the nitrogen and phosphorous loads by implementing or funding offsite management measures. Before using an offsite option, a development shall implement structural BMPs **that achieve 50 percent or more of the needed reduction in nitrogen**, and 60 percent of the needed reduction in phosphorous and shall meet any requirements for engineered stormwater controls described in Sub-item (3)(a)(iii) of this Rule . . . “

Redevelopment

The Commission seeks public comment on the question of which rule the redevelopment requirements should be defined, the New Development Rule (0.277) or Existing Development Rule (.0278.)

Durham and Charlotte are the only two jurisdictions in North Carolina that impose requirements on redevelopment. Durham took this approach in anticipation of having to make load reductions from existing development.

The challenges of redevelopment vary from community to community. Durham feels that redevelopment belongs in the Existing Development Rule and that redevelopment provisions should be included in the Division's Model Program for Existing Development, rather than incorporated inflexibly in rule language. This approach would provide a benchmark but provide flexibility for each local government to adapt and tailor the requirement to local conditions.

Reductions that are made during redevelopment will count toward the jurisdiction's Existing development goals. It might confuse matters to include redevelopment under new development rule and have it reported there when it will also be reported under Existing Development.

Hobby Farms

Stormwater Services agrees that hobby farms must be included in the rule packages and that the appropriate location for inclusion is the agriculture rule. While hobby farms may not be subject to agricultural cost sharing, they are often run as primary or side businesses for their owners. Stormwater management programs should be required for hobby farms that contain sufficient numbers of animals. Any hobby farm adjacent to a perennial stream, regardless of the number of animals, should maintain a storm water management program to prevent, to the extent possible, waste material from entering creeks.

Kennels

Durham Stormwater Services agrees that dog kennels be subject to nutrient management rules. Dog kennels located within the City limits have been required to comply with illicit discharge ordinances prohibiting discharges to storm sewers, as required by Durham's storm water NPDES permit. However, dog kennels outside the City limits do not have to comply with waste discharge requirements, even if a storm sewer is the recipient of wastewater from cleaning the kennels. This is not only a source of nutrients, but also a source of bacteria and viruses. Additional on-site waste treatment should be required for kennels that are not served by regional wastewater facilities.

Rules for dog kennels and hobby farms should be implemented watershed wide as part of Stage 1 and should include the entire Falls Lake watershed.

Community Gardens

Stormwater Services disagrees with regulating community gardens of less than or equal to one acre. Community gardens within the City limits have been encouraged in the City of Durham, primarily through community enhancement and youth programs. Community gardens can replace impervious surfaces or utilize abandoned lots thereby having beneficial stormwater impacts while reducing crime and enhancing neighborhoods. A one acre lot may be appropriate for a large community to cooperatively maintain, particularly if this community garden serves

multi-family dwelling units such as townhomes or apartments. Stormwater Services agrees that fertilizer management programs for community or home gardens greater than one acre should be included as part of a pollution prevention program.

Comments On Goals Rule

Goals Rule.

Conservative decisions have compounded to create targets that are inflated. The City of Durham commented on the use of a single point and the use of 2006 as the baseline year in previous memorandum (dated March 30, 2009 and attached) and in verbal comments at the public hearing. The City also provided DWQ with a memorandum prepared by TetraTech, Inc., which highlights the tributary nutrient load contribution from algae, which had not been previously presented. The tributary algae load, when compared to other sources of nutrients, is not insignificant. When evaluating nutrient reductions from the upper five tributaries, reductions to the tributary algae load were not correspondingly reduced to account for reduced nutrients in the tributaries. In a meeting on August 11, 2010, DWQ staff stated they were aware that they had not reduced the algae loads and felt this was a conservative assumption (this information has never been provided to the general stakeholder group). However, this conservative assumption alone can significantly shift the nutrient reduction curves on which this strategy is based. When considering this conservative assumption, along with conservatively assuming static benthic loads, negligible lower watershed nutrient contributions, biasing the modeling to only consider the upper 5 tributaries, using a single point to determine the strategy, and other conservative assumptions, it appears DWQ entered the development of this strategy with the intent to create the largest possible reduction target for the upper Falls communities and only the upper Falls communities. The state legislature mandated that a nutrient management strategy be developed for Falls Lake based on a calibrated nutrient response model. However, the conservative assumptions that have been made throughout the development of the strategy have created a strategy with a goal that could not be achieved even if the entire watershed was reforested. In order to properly evaluate the lake, and not rely on acknowledged conservative assumptions, Stage II targets must be re-evaluated.

Discussion of Fiscal Analysis For the Proposed Nutrient Strategy for Falls of The Neuse Reservoir

(June 9, 2010)

Summary

The Fiscal Analysis for the Proposed Nutrient Strategy for Falls of The Neuse Reservoir (June 9, 2010) was better researched and more extensively referenced than previous similar work. It takes advantage of new reference materials and studies. Nevertheless, estimates of the total cost for restoring Falls Lake are misleading and extremely optimistic. The estimate provides a false picture of the actual costs the City of Durham faces with the Stage 2 targets.

The Fiscal Analysis is based on the following flawed assumptions:

- The Fiscal Analysis assumes that there will be sufficient locations suitable for the suite of BMPs selected for cost evaluation, and that BMPs will not be sited so as to drain from one to another.
- The Fiscal Analysis is based in part on “*the level of preparedness and implementation shown by Durham and others*” and “*the pro-active nature of these local governments, which includes Durham having completed watershed restoration planning for at least two of its Falls watersheds.*” (p. 72) While watershed planning has begun to prepare Durham for implementation of retrofits, the City will need to identify additional funding in order to build retrofits, and will need to hire additional engineering staff to coordinate design and construction contracts, legal agreements and easements, etc. The City has additional watershed plans it must develop, and cannot simply shift resources. The City will need to expand resources in order to complete Stage I by 2021.
- The Fiscal Analysis assumes that 25% of the retrofit BMPs will be infiltration devices in contradiction to its own guidance. The NC Division of Water Quality Stormwater Best Management Practices Manual does not recommend infiltration devices on poorly drained soils that predominate in most of the developed portions of the watershed.
- Existing Neuse, Water Supply Watershed, and Phase II requirements are substantially controlling nutrient loads from land development, reducing Stage I needs.
- Benefits were determined based on an unsupported assumption that quality in the lake will decline without these rules, ignoring existing Neuse, Water Supply Watershed, and Phase II requirements.
- The use of Net Present Value, incorporating a discount rate of 7 percent, misrepresents the true costs of program implementation.

Durham recently completed, under contract, an analysis of the Ellerbe Creek watershed including new structural BMPs that could be installed to provide better stormwater treatment for bacteria, sediment, and nutrients. Unlike rules such as the Falls Rules and Jordan rules, which theoretically suggest that certain reductions can be achieved through existing development programs, this analysis looked at actual conditions in the Ellerbe Creek watershed including

topography, utility lines, and land uses. This analysis included extensive field work and preliminary estimates of BMP design to provide the City with a plan for including new stormwater control and treatment projects in its capital improvement program. The Ellerbe Creek watershed plan included the analysis of many different types of management strategies not limited to existing development. These included implementing new requirements for new development, funding retrofit projects for existing development, and potentially using low impact development techniques in the watershed. (An executive summary of this project is provided on the DWQ website, <http://portal.ncdenr.org/web/wq/ps/nps/fallslake>.) Pulling from this watershed plan, an existing development cost for the Ellerbe Creek watershed was estimated at \$320 to \$370 million. Implementing all of the recommended projects does not, however, result in achievement of the reduction goal. In fact, it only resulted in achieving 8 to 11 percent nitrogen reduction and 10 to 15 percent phosphorus reduction.

In order to estimate potential costs in other portions of the City, an additional analysis was performed for the Eno and Little Lick Creek watersheds. This additional analysis was performed using the results of the Ellerbe Creek watershed plan. Assuming similar projects could be located in the Eno and Little Lick watersheds, and that similar removal could be obtained from those projects, a cost estimate for retrofitting these two watersheds of \$275 million. Similar to the Ellerbe Creek projects, this cost is not anticipated to result in meeting the water quality reduction targets. DWQ has posted a City of Durham memorandum describing this analysis to their website at <http://portal.ncdenr.org/web/wq/ps/nps/fallslake>.

Based on these estimates, which are much more accurate than the theoretical approach DWQ used in the development of its fiscal analysis, Stormwater Services anticipates a cost of \$645 million dollars, measured in 2009 dollars, to achieve only 8 to 12 percentage reduction in nitrogen, and 10 to 21 percentage reduction in phosphorus. The Stage 2 rules, in contrast, require reductions of 40 percent nitrogen and 77 percent phosphorus. This information was provided to DWQ in February 2010 and DWQ incorporated similar information in a draft fiscal analysis. However, that draft analysis was then replaced with the current analysis which uses another method of calculation that grossly underestimates the cost of addressing existing development. The first draft fiscal analysis performed by DWQ is much closer to what the actual costs may be, although still a low estimate. The City of Durham would like for DWQ and the OMB to reanalyze the costs to provide a more realistic estimate of the total cost of the Existing Development rule for Stage 2.

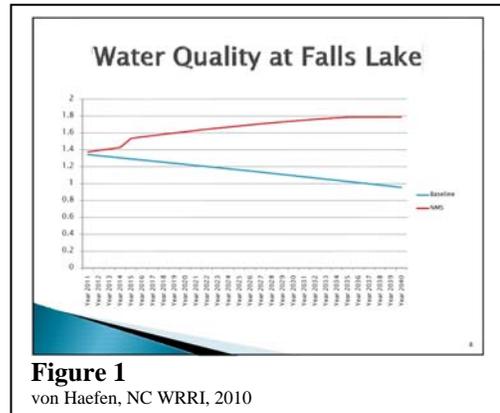
Benefits

Willingness to pay: We agree that North Carolinians are willing to pay for improved water quality. Page 29 of the Fiscal Analysis provides a benchmark that DENR staff and the Commission should review: North Carolinian's mean willingness to pay for improved water quality is given as \$135 per year.

The analysis unfortunately strays into applying this per capita value to the entire state, as if all the citizens of North Carolina will end up paying to fund water quality improvement in Falls Lake. A more appropriate use of this benchmark would be to apply it to the residents of the watershed who will end up paying for Falls Lake.

The average Durham household is paying an annual bill of \$350 per year for stormwater and sewer service combined, which works out to a per capita amount of \$159. Durham residents are already paying more than the benchmark.

Recreational Benefits: On page 33, the recreational benefits of the rules to users of Falls Lake and Eno River State Parks were estimated to be between \$179 million and \$336 million, using a discount rate of 7%. This estimate is based on a baseless and spurious assumption that without the rules, chlorophyll a in the lake would increase 1% annually. By inspection of the Dr. von Haefen's figure depicting water quality, more than half the benefit ascribed to the rules will be from preventing a presumed decline in water quality.



The basis of this assumption is not clear. Trends reported by Ecological Associates and by the City of Durham for the upper part of the lake indicate that water quality has been holding steady or improving. The assumption of decline appears to ignore what is reported on page 71 of the Fiscal Analysis: “All local governments, however, require stormwater controls on development over certain intensities under one or more of the following mandates: Water Supply Watershed protections, Phase II NPDES stormwater, Neuse stormwater . . .”

Existing Development Costs

Existing BMPs Not Accounted: On page 71 (p 71) “All local governments require stormwater controls on development over certain intensities. . . All new development controls installed since the lake’s baseline year, 2006, serve as **reduction credits** relative to an untreated runoff condition toward a local government’s Existing Development reduction need.”

Durham has been applying Neuse and water supply watershed requirements since at least 2002, Phase II requirements since April 2009 while Falls Lake requirements became effective June 15, 2010.

The City is in the process of completing an analysis of projects completed since the baseline year, 2006. This analysis has been facilitated by nutrient yield calculations and record keeping for the Neuse NSW program. The City has compiled all of the projects approved, has accounted for projects that were revised and resubmitted. A spreadsheet is being used to calculate nitrogen and phosphorous yields for each project, with, and without treatment and offset payments. The City imposes requirements on redevelopment that are beyond state regulatory requirements, and these projects must be identified and tracked separately.

Our preliminary results indicate that in Durham the combination of the three programs - Neuse, Water Supply Watershed, and Phase II – have accomplished significant control of nitrogen. Nevertheless the additional amount of nitrogen that must be addressed to achieve Stage I goals is daunting.

Sufficient Opportunities for Retrofits Assumed

On page 72, the Fiscal Analysis assumes “that sufficient opportunities exist for installation of these BMPs to achieve the needed reductions.” The Ellerbe Creek Watershed Improvement Project found that good sites for wetlands will be exhausted fairly quickly, requiring the use of less cost-effective measures. We expect ideal sites for the next most cost-effective measure to also be exhausted.

Diminishing Cost-Effectiveness - The top figure to the right is from the Ellerbe Creek study; the two figures below it are from presentations at the 2010 NC WRI Annual Conference. Each graph shows initial success, followed by diminishing returns as the sites suitable for the most cost-effective solutions is exhausted.

Each of these curves models available sites in a given watershed. They demonstrate that the best sites are finite.

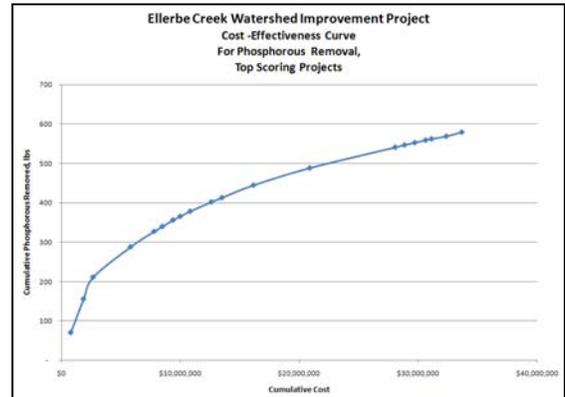
The figures demonstrate that costs cannot be linearly projected. All three curves demonstrate flattening and suggest a maximum reduction that may be achieved for a given watershed.

Cost Projections & Limits - The City of Durham has estimated the costs for implementing retrofits in three watersheds, Ellerbe Creek, Eno River and Little Lick Creek. The City evaluated a wide variety of options to reduce nutrients. Based on combining all the best options evaluated, the City estimated a total cost of \$595 million to \$645 million to implement projects to achieve one-third of the Falls nitrogen reduction, and one-quarter of the Falls phosphorous reduction.

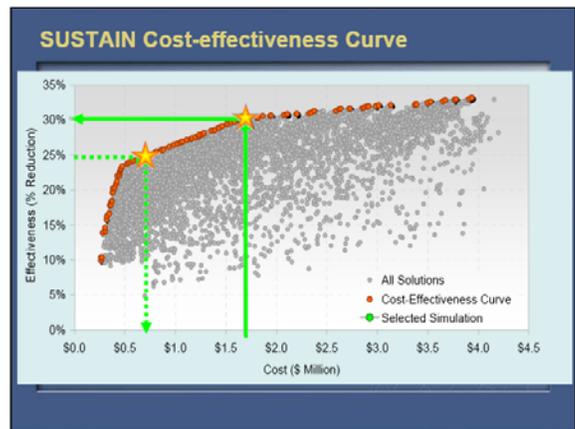
We are unable to project costs to achieve the full reductions required under the Falls Nutrient Management Strategy because the cost cannot be projected linearly. The curves in fact suggest that there are limits as to what can be achieved.

Preparedness of Local Governments - On page 72, the Fiscal Analysis assumes compliance with Stage I goals by 2021, based in part on “the level of preparedness and implementation shown by Durham and others” and “the pro-active nature of these local governments, which includes

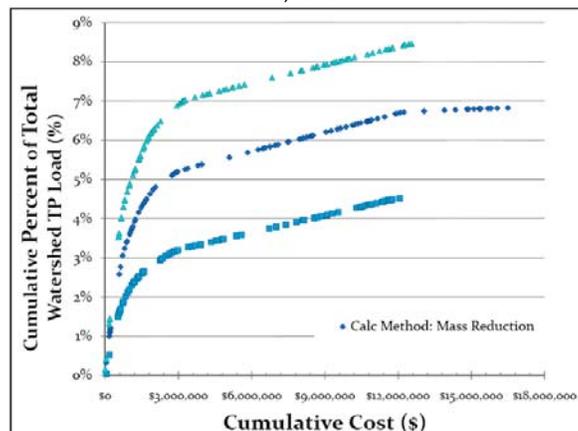
Retrofit Cost-Effectiveness Curves From Several Sources



Ellerbe Creek WIP, 2010



Job, 2010



DeBusk, 2010

Durham having completed watershed restoration planning for at least two of its Falls watersheds.”

- The Upper Neuse River Basins Association deserves credit for obtaining grants, hiring consultants and rounding up stakeholders to complete the Little Lick Creek watershed plan, although the City was an active and supportive member of that effort. The City can take primary credit for completing the Ellerbe Creek watershed plan.
- Conducting watershed plans is a very different activity, requiring different capabilities and technical skills, than completing construction projects. While the City is quite proud of the accomplishments it has made thus far, much of that success has been achieved by working with other partners and through leveraging of grants and mitigation funds. A few demonstration projects have been completed with City funding but the City does not currently have sufficient staffing or funding levels to reach Stage I goals by 2021.
- Durham will need to hire additional engineers and support staff, and to increase stormwater utility rates in order to fund building dozens of major projects we believe will be required to meet Stage I goals for Existing Development. It is not possible to address both the funding issues and build capacity quickly.

BMPs selected - Page 77 provides the BMP proportions assumed for meeting existing development reductions. The list includes infiltration devices at 25%. We note that the NC Division of Water Quality Stormwater Best Management Practices Manual does recommend infiltration devices on “poorly drained soils” predominate throughout much of the developed portions of the watershed. (Table 4-2, p. 4-6)

Rosy Projections - Page 84 begins a discussion of Uncertainty and Alternatives, which includes unfounded speculation: “We expect, however, that more cost-effective solutions to conventional BMP retrofits will continue to emerge.” This runs counter to the law of diminishing returns discussed above. It is also unlikely because of the way that BMPs work.

In 2000 Eric Strecker demonstrated that stormwater treatment practices produce effluent concentrations that are within a very narrow range. Subsequent work has verified this result and has demonstrated that installing BMPS in series does not significantly change the effluent concentration.

These limits result from the fact that current stormwater treatment systems are passive in nature, and in fact, produce effluent concentrations that are similar to that produced by nature. Obtaining lower concentrations will require an active, managed treatment technology paralleling the development of wastewater treatment. Active treatment systems will be more expensive to operate and manage than passive system.

Impact on Citizens of Durham

As indicated elsewhere, the City’s current revenues of \$9.8 million per year do not include a formal program to retrofit existing development. Durham has estimated a minimum cost of retrofitting existing development of \$645 million, with that figure only meeting a portion of the Stage 2 goal. Rates may have to increase by 600% in order to achieve even the partial reductions of the \$645 million program within the time frame proposed for Stage II.

A figure like \$645 million dollars is incomprehensible to the average citizen, and perhaps even to the EMC. The only way such a figure has meaning is if it is translated into actual rates that normal citizens, institutions, and businesses will have to pay to fund these stormwater retrofits.

Durham's storm water fee is calculated by analyzing the total impervious area per tax parcel. The fee is assessed annually on residential and commercial properties, as well as public service properties (e.g., hospitals, schools, parks, clinics, etc). A simple analysis was performed to determine what changes to storm water fees would need to be implemented in 2011 to generate \$645 million dollars in sufficient time to meet the Stage 2 goals in 25 years. This simple analysis assumes the City would be able to put forth any level of increase to the fee, with immediate acceptance by the City Council, and no subsequent lawsuits. Currently, an average household pays a storm water fee of approximately \$59 annually. In our analysis, this fee would increase to \$420 annually. The impact on institutions is equally as severe. Durham Public Schools within the City limits currently has a storm water fee of approximately \$150,000 annually. This fee would increase to \$1,050,000. The Durham Regional Hospital currently pays approximately \$42,000 annually and its stormwater fee would increase to \$290,000 annually. Stormwater fee increases to these levels would certainly not be supported by rate payers and are unsustainable.

Falls Lake Impervious Surface Study,
City of Durham Public Works,
Stormwater Services, 2010

Introduction

The purpose of this study is to demonstrate the availability of cost effective remote sensing tools that can assist in characterizing a watershed. Such characterization can include identification of impervious cover in a watershed and areas high sediment loads. This study focused on the impervious surface coverage within a one mile buffer of Falls Lake.

Impervious Area Extraction Processes

In March of 2010, high resolution Satellite Imagery was collected of the one mile buffer region surrounding Falls Lake using the WorldView-2 satellite. The data was formatted as 46 cm panchromatic four band standard colors: blue, green, red, near-IR 1 resolution and delivered as geo referenced 16 –bit and 8 –bit tiff images. This is the highest grade satellite imagery commercially available.

Impervious areas were extracted from these tiffs via batch and two iterations of refinement extraction processing using Feature Analyst™.¹ The one mile buffer area was also analyzed using a digital elevation model and degree of slope model to confirm that all indentified impervious areas were within the Falls Lake drainage system.

The buffer was delineated into three sections based on which county the land was located within (Wake, Durham and Granville). The extraction data was further delineated by parcel boundaries obtained from Wake, Durham, and Granville counties. A further delineation identified the impervious areas east and west of NC Route 50 within the one mile buffer region.

The extraction and the resulting impervious area estimates were verified for quality through comparing the extracted data with hand digitized data for a random sample of 10% of the parcels. This process indicated that the digital extraction is 87% accurate at identifying impervious areas. Summing the identified impervious areas to calculate total impervious areas reported in this study is not a process that would add bias to the data; therefore the total impervious area is 87% accurate as well.

After the accuracy assessment process was completed, further impervious area identification refinement was not deemed useful. Such refinement would only more accurately identify impervious area on each individual parcel. It would not change the areas that were identified as having a higher percentage of impervious area (and therefore a greater risk of poor water quality downstream).

¹ Feature Analyst™ was developed by Visual Learning Systems (VLS). It is the same program that is used by the National Imagery and Mapping Agency (the federal agency that sets the mapping standards for the United States) for the production geospatial information from imagery data.

Findings

All impervious areas identified within a mile of Falls Lake were within the lake's watershed. The following tables provide further information about the amount of impervious area identified in each county.

Entire Study Area: Falls Lake and One Mile Buffer

	Total Area (including lake)		Total Impervious Area		% Impervious Area Coverage
	square feet	square miles	square feet	square miles	
Durham	899,688,259	32.3	37,053,410	1.3	4.0%
Granville	381,717,060	13.7	16,114,112	0.6	4.4%
Wake	1,889,733,939	67.8	149,975,841	5.4	8.0%

Portion of Study Area West of NC 50

	Total Area (including lake)		Total Impervious Area		% Impervious Area Coverage
	square feet	square miles	square feet	square miles	
Durham	0	0.0	0	0.0	0.0%
Granville	83,719,856	3.0	2,491,890	0.1	3.0%
Wake	1,525,889,287	54.7	138,812,987	5.0	9.1%

Portion of Study Area East of NC 50

	Total Area (including lake)		Total Impervious Area		% Impervious Area Coverage
	square feet	square miles	square feet	square miles	
Durham	904,118,099	32.4	37,053,410	1.3	4.0%
Granville	291,585,497	10.5	13,622,222	0.5	4.7%
Wake	365,826,519	13.1	11,162,854	0.4	3.1%

In the course of extracting the impervious areas and then performing a check of the data quality, some other interesting areas were observed in the imagery. One of these areas is shown in Figure 1 below. (This image is shown in infrared rather than true color.)

Figure 1 Tributary of Falls Lake with Large Sediment Load



Those familiar with reading satellite imagery can easily see the large sediment load entering this tributary of Falls Lake. Using satellite images, enforcement officials tasked with reducing sediment levels in the lake would be able to concentrate their efforts in areas where the need was greatest.

Conclusions

The four band image data used in this study provided information about areas where a high percentage of impervious surface cover could lead to poor water quality in Falls Lake. It also demonstrated satellite imagery's ability to highlight areas with high sediment loads.

High quality satellite imagery provides spatially continuous data that not even the best chemical or biological water monitoring program can provide. This allows for easier identification of spatial patterns. Having a series of such images over time creates the ability for real life inputs to be used in modeling water quality impacts on a water body.

Satellite imagery (especially with panchromatic and multispectral bands specifically chosen to allow characterization of water pollution) can be a highly effective tool in the water quality improvement process. The regular acquisition and use of satellite imagery should be strongly

considered for the Stage 2 reevaluation of target loads of nitrogen and phosphorus to Falls Lake.

Falls Lake Misconceptions

There are numerous misunderstandings about issues in Falls Lake and about steps advocated by Durham and many other local governments.

1. **Myth: There is no new information being collected that would inform re-examination of Stage II goals**

- Since completion of monitoring that lead to the Falls Lake Model, the City of Durham has funded construction and operation of new USGS stations to measure rainfall, stream stage and stream flow. This expands Falls watershed USGS stream gages for Durham from two to five.
- At locations where stream flow data will be available, Durham has increased sampling for nutrients to three times per month.
- Durham has begun collecting in-stream samples of chlorophyll *a* to assess the boundary condition for Falls Lake at Ellerbe Creek. Measurements were not available for this boundary condition when the Falls Lake Model was being developed.
- Durham is funding the construction and measurement of the deposition of atmospheric nitrogen (both wet and dry deposition).
- Durham is funding a full weather station so that future models will not have to rely on distant stations for critical inputs.
- We are aware of ongoing studies by others that are measuring nitrogen and phosphorous yields for forested areas in the watershed.
- Durham is working with County Environmental Health on various projects related to on-site wastewater disposal that will yield important results in the near future.
- A researcher at NCSU has measured storm nutrient loads for several streams in Wake County.
- Finally, Durham will be meeting with other stakeholders in September, including the City of Raleigh, to begin leveraging our individual existing programs and develop a more comprehensive, expanded, regional monitoring program for the watershed and the lake.

2. **Myth: Local government want a “pause” before implementation of Stage II**

- Durham seeks a mandatory re-examination of goals before Stage II is implemented. That re-examination can be completed before the completion of Stage I.

3. **Myth: Local government want to see the impact of Stage I improvements on the lake before implementing Stage II**

- Lake sediment is a significant source of internal loading in Falls Lake. Exchange between lake sediments and the water column will tend to keep

nutrients in the system for many years after inputs have been reduced. The lake is likely to respond very slowly to changes in inputs. Given normal year-to-year variability and the short seven years to complete Stage I, we do not expect to see changes in lake response that are statistically significant.

4. Contention: Low Impact Development should be mandated in the Falls Lake watershed

- North Carolina has been a leader in many aspects of stormwater management but low impact development has been a notable exception. Hunter Freeman, one of North Carolina's most knowledgeable advocates of low impact development, has been critical of the impediments imposed by North Carolina's treatment approach to stormwater runoff, which relies exclusively on engineered controls. [Personal communication]
- Low impact development does not focus on treatment of stormwater. Instead it focuses on reducing the volume of runoff leaving a site to mimic pre-development conditions. This volume control is accomplished by using numerous small practices that intercept or extract volume, which may be evaporated, infiltrated, or released so slowly that it becomes baseflow.
- Low impact development has been developed for, and demonstrated to work for, areas with pervious soils such as the glacial till in the Pacific Northwest and the coastal plain soils of Maryland, areas where infiltration can be relied upon for volume reduction.
- States in the Chesapeake Bay have moved toward runoff reduction and have developed calculation tools that are consistent with low impact development. Maryland and Virginia have Triassic soils. Each of these states has developed a calculation tool that gives credit for low impact development management practices that can be used on hydrologic "D" clay soils.
- Maryland has offered credit for rooftop disconnection since 2000 (CSN website, 2010). Both Maryland and Virginia have tools that explicitly provide credit for disconnecting any type of impervious surface. [Virginia Nutrient Design System, v1.0; MD_ESD_to_MEP_Spreadsheet, R2]
- Maryland, Virginia, and other Chesapeake Bay states facing nutrient requirements, also allow LID credit for open space conservation, rain barrels, cisterns, soil amendments, pervious pavement and other infiltration practices on hydrologic D soils. Each state includes other practices that
- North Carolina calculation methods treat disconnected impervious surfaces the same as those that are directly connected. An air-conditioner pad or paved walkway surrounded by lawn or forest is treated the same as a road with curb-and-gutter collection of runoff.
- The DWQ Stormwater BMP manual does not recommend permeable paving systems for stormwater credit in most areas of the central and western parts of the state.
- North Carolina does not recognize amendment of soils as a means of retaining water on site to mitigate increases in runoff volume. North Carolina affords no volume reduction credit for pervious pavement on Triassic Basin soils, and cisterns are not eligible for credit unless they have a dedicated year-round use.

- Low impact development is not feasible on Triassic soils without reasonable credit for options that help mimic pre-development hydrology.

5. Myth: Algae blooms have already caused beach closings at Falls Lake several times this year

- Beach closings are caused by elevated levels of indicator bacteria, E. coli and Enterococci. Both are found in the intestines of warm-blooded animals, including humans. Many lakes have substantial goose populations, and Richard Costello, of the Raleigh Parks and Recreation Department has begun asking people not to feed birds to reduce the impact of bird wastes.
- Beach closings have nothing to do with algae. Because bacteria from warm blooded animals generally do not persist in the environment, their occurrence is generally related to local sources, e.g. local wildlife or runoff from local streams.

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Document follows**

To: Kathy Stecker, NC Division of Water Quality
Through: John Cox, Water Quality Manager
From: Michelle Woolfolk
Date: March 30, 2009
RE: Preliminary Comments on the Falls Lake Nutrient Management Strategy and Total Maximum Daily Load (TMDL) Target Setting

The City of Durham Stormwater Services appreciates the opportunity to comment on the proposed target methodology for the Falls Lake Chlorophyll *a* Nutrient Management Strategy and Total Maximum Daily Load. This memorandum has been written to respond to the request from NC Division of Water Quality (DWQ) staff to the Falls Lake Technical Advisory Committee (TAC) on March 23, 2009. The City of Durham has a strong interest in the appropriate application of the nutrient response and watershed models that have been developed for the nutrient management strategy and TMDL. Stormwater Services staff has participated in the TAC since the first meeting in 2005.

The DWQ Modeling & TMDL Unit presented results of the nutrient response model to the TAC on March 23, 2009. Further, DWQ Staff provided draft nutrient response model documentation and a preliminary selection of targets for Falls Lake. DWQ requested feedback on the chlorophyll *a* target setting guidelines by March 30, 2009. Although DWQ has agreed to conduct another TAC meeting to discuss the targets (tentatively scheduled for April 13 or 14th), Stormwater Services is providing these preliminary comments in order to facilitate the discussion of target setting. The following preliminary guidelines for target setting were presented on March 23rd:

- No exceedances of the chlorophyll *a* standard of 40 µg/L,
- A compliance point of NEU013B,
- Use of 2006 as the baseline year for percent reductions.

This approach is a significant departure from past chlorophyll *a* TMDLs, including Jordan Lake and the Neuse Estuary TMDL. Stormwater Services has the following comments and questions on these three guidelines. Responses to the questions should be provided, in writing to the TAC prior to taking proposed targets to the greater stakeholder group.

Comments and questions regarding the application of a “not to exceed” evaluation of the 40 µg/L water quality standard:

- Why has a paradigm shift occurred from allowing a 10% exceedance of the standard, which is consistent with the use support methodology? Where is the

pressure not to repeat past, relatively successful, applications of the water quality standard? This paradigm change will result in inflated reduction percentages of nitrogen and phosphorus. Please provide documentation of a request of EPA Region IV to allow flexibility regarding the interpretation of the standard and EPA's response.

- How will DWQ address the temporal aspects of applying the standard at “any time” when the nutrient response model predicts chlorophyll *a* every few minutes or seconds? The Jordan Lake TMDL used a daily average of several outputs within a day. This method was selected because the ability of the nutrient response model to predict peaks or valleys within a one-day period was not calibrated nor have any existing monitoring studies attempted to quantify a potential change to nutrients, chlorophyll *a* or biomass within a day. This is also the case with the Falls Lake nutrient response model. If the within-day model variability is relatively non-existent, it may be appropriate to select a specific time to output each day. DWQ should provide documentation of the method selected and discuss potential ramifications with the TAC.
- How will extreme climatic events (e.g., hurricanes, tropical storms or droughts) be treated? Obviously, 2005 and 2007 were drought years, but 2006 also had a large tropical weather event (Alberto). Stormwater Services has not completed a review of the nutrient response model, but in general these models perform poorly around short-term climatic extremes. This is particularly the case when the short-term climatic event has a rapid biological response. DWQ should analyze the effect of short-term extreme climatic events on the model results, devise a methodology for dealing with these, and share that method with the TAC.
- DWQ should include evaluations of the algal populations in the discussion of the 40 ug/L chlorophyll *a* standard. The field study included extensive evaluations of the types of algae present in the reservoir, including algal succession that may occur during the year. The consideration of a “not to exceed” chlorophyll *a* water quality standard will be much more relevant with also considering the types of algae. DWQ should present results of this analysis in the model report.

Comments and questions regarding the selection and use of a compliance point versus a compliance area:

- The current water quality standard for chlorophyll *a* reads as follows:
Chlorophyll a (corrected): not greater than 40 µg/l for lakes, reservoirs, and other waters subject to growths of macroscopic or microscopic vegetation not designated as trout waters, and not greater than 15 µg/l for lakes, reservoirs, and other waters subject to growths of macroscopic or microscopic vegetation designated as trout waters (not applicable to lakes or reservoirs less than 10 acres in surface area). The Commission or its designee may prohibit or limit any discharge of waste into surface waters if, in the opinion of the Director, the surface waters experience or the discharge would result in growths of microscopic or macroscopic vegetation such that the standards established pursuant to this Rule would be violated or the intended best usage of the waters would be impaired (15A NCAC 02B .0211(3)(a))

The standard does not address spatial or temporal evaluations of chlorophyll *a*. Thus, the change from evaluating a compliance area to a compliance point is a policy change made some time during the Falls Lake process. Point compliance can be arbitrary with no ecological significance or can directly manage to a particular use at a particular location (e.g., water supply intake for the City of Raleigh). The issue of point versus area compliance was discussed in the stakeholder processes for both the Neuse Estuary and Jordan Lake. Stormwater Services believes that the analysis behind this policy change should be provided to the TAC. Further, as with previous stakeholder processes, this policy should be selected with TAC input.

- The use of NEU013B as a compliance point provides significant concern as this monitoring station was added in 2006 and has no historical record of water quality measurements. As the TAC was not provided with any additional information regarding the selection of NEU013B, this action appears to be arbitrary. DWQ should provide the TAC the rationale for selecting this compliance point, particularly when there is no historical evidence to support problems at this location.
- The monitoring station in the Little Lick Creek cove was specifically requested in order to evaluate water quality in coves. The selection of one compliance point ignores TAC concern regarding cove water quality and management. Even if does not choose to select a cove “target”, DWQ should discuss the use of the modeling tools for cove water quality.
- Assuming a particular cell will be relied upon to compare to NEU013B (or other compliance point), there is an over-reliance of the model to predict one model cell accurately, versus predicting an area of the lake accurately. In other words, any deviation of that one cell, regardless of what is happening in adjacent model cells, will be magnified in the target setting. Given that a three-dimensional model was created, there are potentially dozens of surrounding cells that are not considered in the target setting but contribute greatly to water quality at a single cell. The potential error in this approach is quite large and will literally mimic the standard error associated with that once cell and the monitoring point.

Since boats drift during sample collection, Stormwater Services has no confidence that NEU013B is, in fact, always in the exact same model cell; the sample may have been collected in any adjacent cell while the depth integrated sample was collected. This will add additional error should a single compliance point be selected. DWQ should provide an evaluation of the potential error using a single compliance point versus a larger compliance area.

Comments and questions regarding the selection of 2006 as the baseline year for the TMDL and nutrient management strategy:

- At this point, Stormwater Services has no objections to the use of calendar year 2006 as the baseline year for the TMDL and management strategy. It is unfortunate that the other two years of monitoring included severe droughts and a loss of chlorophyll *a* data. These are certainly good reasons to omit model results for these years.
- To facilitate future discussions regarding the baseline year, it would be useful to evaluate monthly precipitation and hydrology in detail, particularly heading

into the 2007 drought and out of the 2005 drought. It may be that even 2006 is an “abnormal” year in and of itself in terms of lake response. Also consider that although precipitation was available in 2006, it took some time for the reservoir to reach normal pool. Upstream reservoirs were also filling at the same time, so there was a lag for Falls Lake. Estimates of lake residence time, or residence times for the “lower” and “upper” portions of the lake, may also assist in target setting.

- Discussions of target setting would benefit from additional analysis and interpretation of the affects of the 2005 and 2007 droughts on 2006 water quality. When compared to the long-term water quality data, was 2006 unusual? Was the lake recovering from the previous drought, or did the lake recover before beginning the 2007 drought? This may impact not only the target setting but also the selection of a TMDL margin of safety.

It is impossible to anticipate the effects of the preliminary target setting when reviewed water quality models have not been received by TAC members, nor discussed in TAC meetings. The review of target setting is the last duty of the TAC. DWQ should allow the TAC sufficient time to consider the preliminary target setting and allow DWQ staff sufficient time to provide clarification and respond to questions.

Stormwater Services recognizes the need to have a sustainable Falls Lake for the future use of all Upper Neuse Basin communities. Further, any strategy for Falls Lake will also result in improvements to Lake Michie and Little River Reservoir, water supply reservoirs for the City of Durham. Stormwater Services staff looks forward to the successful completion of the TAC process and future discussions of the greater stakeholder process.

cc: Falls Lake TAC
Paul Wiebke, City of Durham
Sarah Bruce, UNRBA