
September 14, 2007

Environmental Management Commission
c/o Rich Gannon, Division of Water Quality
1617 Mail Service Center
Raleigh, NC 27699-1617

Dear Commissioners:

We appreciate the opportunity to offer comments on the NC Environmental Management Commission's proposed nutrient management rules for the Jordan Lake Watershed. The NC Conservation Network is a statewide network of over 120 environmental, community and environmental justice organizations focused on protecting North Carolina's environment and public health. Our supporters include thousands of North Carolinians who visit, fish, swim in, or drink the waters of Jordan Lake.

Years of study and ongoing water sampling have confirmed that Jordan Lake receives far too much nitrogen and phosphorous pollution. Virtually every major town or city upstream from the lake also suffers impairment of local streams from the same sources of pollution: wastewater discharges and stormwater runoff. The EMC's proposed package of Jordan rules is badly needed to control nutrient pollution and to protect the environmental health and economic vitality of the Jordan Lake watershed.

Attachments to this letter include the various studies referenced in support of our comments below. In a category by themselves, however, are 197 comment letters submitted by members and supporters whom we contacted to let know the comment period was open. At the request of Division of Water Quality (DWQ) staff, to ease their logistical burden, we have gathered these comments electronically and are submitting them along with this letter. We ask that the comments be read and counted as independent comments on the rules. The authors wrote their own views, most in their own words, ranging from laconic to lyric, and occasionally at odds with our own recommendations. Reading these citizen comments, we have found ourselves impressed by the thoughtful arguments, and reminded of the great meaning Jordan Lake and its tributary streams have for residents in the watershed and across the state.

The Jordan rules appear likely to receive legislative scrutiny; the hearing officers' report will provide the EMC's best opportunity to help legislators understand the context and rationale for the EMC's final rule. For that reason, while our comments on rules usually focus on changes to rule text, in this letter we also at points recommend that the Hearing Officers use their report to clarify important points that may help legislators to better understand the purpose and effect of the rules.

**Strong rules are needed to rescue the watershed from growth-induced pollution.**

From the time of Jordan Lake's construction, observers have predicted that the lake would suffer from excessive nutrient pollution. In 1997, in SL1997-458, the Clean Water Responsibility Act, the NC General Assembly instructed the NC Department of Environment and Natural Resources to develop and implement total maximum daily loads (TMDLs) to bring nutrient sensitive impaired waters into compliance with federal water quality standards. According to the original timetable for Jordan Lake, rules to limit nitrogen and phosphorus inflows into Jordan Lake should have been finalized in 2003.

Instead, as the Jordan Phase I TMDL notes, the Upper New Hope arm was listed as impaired for chlorophyll a in 2002; the Lower New Hope Arm and Haw River Arm were listed as impaired for

chlorophyll a in 2006; and the Haw River Arm was also listed as impaired for pH in 2006. The Jordan Lake watershed has experienced tremendous growth, accompanied by a great increase in impervious surfaces and runoff from those surfaces, and so it is no surprise that more pollution is reaching the lake each year.[1]

Meanwhile, the process of developing rules to protect the lake has been glacial. Under the best case, various deadlines in the proposed rules will mean several more years of delay before the Jordan Lake begins to benefit from on the ground application of post-construction stormwater controls for new development, riparian buffers, and retrofits to control runoff from existing development. Every further delay allows more pollution to accumulate in the lake, and places the waterbody at greater risk of an ecological crash – a series of fish kills or severe algae blooms – that would cause substantial economic as well as environmental harm to the region.

**Overarching issues: reduction allocations, adaptive management, and costs of implementation.**

When a TMDL is being developed, interests representing the various sources of pollution commonly complain that they are being unfairly singled out. In the case of the Jordan Lake TMDL, farmers have worried that the rules favor development; local governments have objected that the rules let farmers and foresters off lightly; developers have objected that wastewater treatment plants and farmers are slacking. With an apparent straight face, at least one set of local governments has argued that it is unfair for local governments to be held responsible for their share of the pollution, because farmers can reduce pollution so much more cheaply.[2] We observe that this is why the package of rules includes .0269, allowing trading between different sources, to keep the overall cost of compliance as low as possible. However, with the respect to the allocation of reductions, EPA's TMDL guidance clearly directs that each source be responsible for its share of the pollution. The Division of Water Quality's careful modeling follows this guidance and splits the responsibilities among the various pollution sources as accurately and fairly as possible. Moreover, once the federal Environmental Protection Agency (EPA) has approved the Total Maximum Daily Load (TMDL), the reduction allocations are set for purposes of drafting or adjusting the state rule. We recommend that the EMC express this point decisively in the hearing officers' report, as it may give legislators a clearer sense of the legal framework within which the state must operate.

The draft rules (.0262(7)) address adaptive management thoughtfully. As EPA guidance makes clear, adaptive management refers to the process of first aiming at the reduction targets; and then, as we approach them, fine tuning to hit them precisely. The concept does *not* mean starting hesitantly, or aiming lower than full compliance with the promise or hope of someday closing the gap between the idea and the reality. During the comment process, some local governments have suggested that the concept of adaptive management could justify putting off any real implementation of the TMDL while the state conducts another round of studies to confirm that Jordan Lake and upstream waterbodies are in jeopardy. That is a grave misprision of the way adaptive management works, and one that EPA will not endorse. While the draft rule text is good, we recommend that the hearing officer report also address this issue directly.

Critics of the proposed rules have, above all, complained that the region cannot easily afford the cost of cleaning up Jordan Lake. This argument is, as a matter of law, moot: the federal Clean Water Act requires that Jordan Lake be restored to health. But more importantly, it rests on a misconception. The costs associated with pollution in the watershed are not new. Until now, they've simply been hidden, as communities charged them against the watershed's balance of natural capital, running up a significant debt in the form of loadings into the lake. For local governments or development interests to object that the rules will place an economic burden on the region is akin to a consumer complaining that, at long last, they are being forced to begin paying off a mounting credit card debt. While many of the upstream

[1] NC DENR, Division of Water Quality, B. Everett Jordan Reservoir, North Carolina Phase I Total Maximum Daily Load, Public Review Draft, April 2007, at 55 [Phase I TMDL].
[2] Piedmont Triad Council of Governments, Jordan Lake Rules: Impacts of Local Governments, slideshow dated April 19, 2007, slide 49 [PTCOG slideshow].

communities did not ask for Jordan Lake to be built, many of the decisions that have damaged the Lake and its upstream tributaries – to allow development without adequate controls on runoff, and to delay wastewater treatment plant upgrades – have been made in the last decade, after passage of the 1997 Clean Water Responsibility Act and well after the environmental consequences of those decisions first became foreseeable.

There is a key difference between financial debt and the pollution loadings to Jordan Lake: credit card debt comes with compounding interest. In contrast, as we slow the inflow of nutrients, Jordan Lake will begin to forgive our principle, as the natural system regains capacity to heal itself. We believe the costs of wastewater plant upgrades, new nonpoint source controls, and stormwater retrofits will be far smaller than critics of the rule have acknowledged. But, however efficiently the rules are designed, there will be costs. The Jordan rules do not create those costs; the rules merely reallocate them from future generations to the current sources of pollution, as required by the Clean Water Act.

**Nutrient management**

The text of the proposed nutrient management rule, .0263, is largely boilerplate, lifted from similar rules in the Neuse and Tar-Pamlico nutrient management rules. We believe a few changes to this rule could provide significant benefits to the EMC, local governments, and water quality in the Jordan Lake watershed.

Land applied biosolids are surely a source of nitrogen and phosphorus in the watershed. However, the model used to develop the TMDL does break out the contribution of land applied biosolids as distinct from other nonpoint sources, making it impossible to know how much of a problem biosolids present. We think it makes sense for the EMC to ensure that the rule will generate the information base needed to allow better policy judgments in the future.

We urge the EMC to ensure that the nutrient management rule covers all municipal biosolid application. The relevant section is .0263 (3), which clearly applies to farmers applying biosolids to their property. It is not clear, however, if a wastewater treatment plant contracts to have its sludge spread on a tract that is not official a farm, whether it is covered at all under the draft text. If this activity is not covered by this section, it appears completely unregulated.

We urge the EMC to require nutrient management plans for all application of municipal wastewater sludge. As proposed, .0263 (4) requires applicators and people hiring applicators to either attend a training *or* complete and properly implement a nutrient management plan. The training is surely valuable, but it provides no base of information for future analysis.

Similarly, we urge the EMC to require that the written management plans be submitted to DWQ. The draft rule, .0263 (6)(d), states that nutrient management plans must be 'kept on site or be produced within 24 hours of a request by the Division', and does require retention of past plans for any length of time past their use. We think it would be simple and wise to require that nutrient management plans for municipal waste be submitted to DWQ. Even if there are no resources to check up on and enforce against plan violations, having submitted plans will provide the information base for DWQ and the EMC to evaluate the need (or lack of need) for further oversight, or to provide for better land application as a part of adaptive management.

Finally, as we discuss below, local ordinances limiting application of law fertilizers are one of the cheapest, most efficient ways for the local governments in the Jordan Lake watershed to reduce the loadings from existing development. There is some danger that, as written, the nutrient management provisions in .0263 could be read to establish a weak but comprehensive scheme of state regulation that impliedly preempts local governments from adopting fertilizer ordinances. We recommend that the rules explicitly state that they do not preempt the authority of local governments to regulate local fertilizer application.

**We recommend that the EMC require point sources to reduce nitrogen by 2011.**

The proposed point source rule, .0270, calls for dischargers to reduce phosphorus by 2009 and nitrogen by 2016. Earlier drafts of the proposed rules called for all the point source reductions to be achieved by 2011. We have seen no scientific justification for delaying the compliance date for nitrogen reductions by five years; we believe the shift was an effort to offer a political compromise to the Haw River dischargers. If so, it failed, as the dischargers immediately took the prospective concession for granted and went on attacking the new development, exiting development, and even the need for point source reductions.

There are compelling reasons for the EMC to fix the deadline for nitrogen at 2011 in the final rule. First, when they occur, wastewater treatment plant upgrades will produce the most quantifiable and reliable reductions of any of the measures required by the rules package. Other parts of the rules either do not address the existing loads (buffers; stormwater runoff from new development), or will entail a significant lag time before loading reductions become evident (agricultural rule; existing development). Already, Jordan Lake and segments of the Haw show extremely stressed and unhealthy conditions during dry summer months. Pegging the point source nitrogen reductions at 2011 will give the watershed some breathing room before the other rules slowly come online.

Additionally, water quality data indicate that the Haw River arm also needs a TMDL for pH (acidity).[3] A TMDL built to address pH violations will call for more stringent WWTP reductions that the current TMDL does. In the past, the City of Greensboro has repeatedly attempted to postpone or evade compliance with federal water quality standards. It took a citizen Clean Water Act lawsuit to force Greensboro to upgrade its wastewater plants in the late 1990s. In the last seven years, while other dischargers tightened the concentrations of nitrogen in their effluent, Greensboro allowed its concentrations to sky-rocket. While the Haw River dischargers now face an estimated collective cost of $154 million to upgrade to comply with .0270, less than $59 million of that is an incremental cost beyond the 1997 Clean Water Responsibility Act limits.[4] Most of the difference reflects the hole Greensboro has dug for itself by failing to upgrade in a timely way. The EMC has no obligation to bail out Greensboro, and it seems unwise to set lax deadlines for the whole watershed to shield one bad actor, particularly when continued declines in water quality may trigger even tighter point source reductions for a number of the dischargers.

**Stormwater for new development**

Off-site mitigation. We recommend that the EMC amend .0265(3)(vi), which allows developers to 'buy-down' stormwater their nutrient control obligations, to drop the reference to .0240 nutrient offset program. The provision already references nutrient trading under .0269. Over the last two legislative sessions, development interests have shown an eagerness to force the state to accept in-lieu fee payments that are manifestly inadequate to offset increased nutrient inflows. We recommend that, rather than expand this bad policy to a new river basin, the EMC simply rely on the provisions of .0269, perhaps tweaking the latter section to allow the Ecosystem Enhancement Program to compete on a level field with other offset options.

Redevelopment. We recommend that the EMC amend .0265(3)(iv) to provide explicit, permissive authority for local governments to require retrofits during redevelopment. As written, the text appears to bar local governments from requiring developers to improve stormwater management where a redevelopment project does not increase the developed area of a property. Yet, such properties may be among the best sites for local governments to require modest retrofits to help meet the reductions allocated to retrofits. For example, one of the few times that pervious pavement is likely to make financial sense as a retrofit is when a property is being redeveloped or repaved.

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[3] Jordan Phase I TMDL, at 55.

[4] Fiscal Analysis, *compare* Table 9.9, All Nutrient Related Costs (Including CRWA) *with* Table 9.10: Incremental Costs (Beyond CRWA). The table of incremental costs does not split out the New Hope and Haw River dischargers, so the incremental cost for Haw River dischargers may be even smaller.

Relationship between Phase II and existing development. We recommend that the hearing officers' report explicitly rebut the argument that Phase II addresses existing development. A few local governments have spread a great deal of misinformation about the Phase II program, arguing that the retrofit portions of the Jordan Rules should be delayed to allow the Phase II program to have a chance to 'solve' the problem of runoff from existing development. To be clear, the Phase II post-construction standards apply only to new development. Other required portions of the Phase II local programs do apply to existing development, notably education and illicit discharge. To the extent that nonstructural programs involving education can help achieve retrofit goals, we support allowing those measures as a part of local retrofit plans. However, the largely undisciplined structure of Phase II education requirements makes them no substitute at all for the existing development rules proposed in the draft rules.

**Stormwater retrofit**

*Stormwater retrofit provisions are an essential part of the Jordan Lake rules.*

The proposed existing development stormwater rule, .0266, is a critical component of the Jordan Lake rules. Under the federal Clean Water Act, a failure to allocate reductions to existing development would mean that reductions from point and new nonpoint sources would have to be correspondingly more stringent. Not only would these increased reductions be tremendously expensive; they might well be technically infeasible.[5] In short, North Carolina cannot comply with its obligations under the Clean Water Act unless the Jordan rules retain an effective existing development provision. Indeed, the cost to communities of making the required reductions in the form of additional point source and new nonpoint source reductions would likely be far higher than the estimated costs of stormwater retrofits for existing development.

*The proposed rule wisely takes a flexible approach to retrofit requirements.*

While stormwater retrofit provisions must be part of the Jordan rules package, the EMC can draft the rule to lie anywhere along a spectrum that runs from emphasizing flexibility to emphasizing certainty. On the flexible end of the spectrum, the rule would set reduction allocations, apportion those among local governments, and allow local governments to develop their own plans for meeting the reductions through a combination – their choice – of structural and nonstructural best management practices (BMPs). On the certainty end of the spectrum, the rule would not only allocate required reductions, but would also tell each local government exactly what BMPs to adopt, on what schedule, to be guaranteed of reaching the mandated reductions.

The proposed rule lies towards the flexibility end of the spectrum. We think this is wise, for several reasons. First, the costs of BMPs change over time. Most costs drop, at least as measured in dollars per pound of nutrient removed. However, the decrease in costs is unpredictable and uneven. Any choice of BMPs by the EMC now is likely to misread the relative cost-efficiency of practices years in the future. Second, the most cost-effective, nonstructural BMPs have less of a track record than structural BMPs, although they are rapidly catching up. Since, under the certainty approach, the list of required BMPs *must* add up to the reduction allocations, the certainty approach is guaranteed to lock local governments into much higher costs than the flexibility approach. Third, local governments should have a better sense of which BMPs will be most effective in the on-the-ground conditions in their jurisdictions; given resource constraints, a state effort to provide certainty would be more likely to impose a 'one size fits all' list of BMPs. Also, new technologies are constantly being developed. An approach built around flexibility creates a strong incentive for local governments to pursue better technologies as they become available, benefiting the entire state as well as residents of the Jordan Lake watershed.

[5] "The Division currently considers equivalent concentrations of 3.0 mg/L TN and 0.18 mg/L TP as the limits of wastewater treatment technology." Jordan Phase I TMDL, at 55.

Finally, the flexible approach allows retrofits to deliver larger watershed restoration benefits. While we are confident that retrofits will cost much less than the estimates listed in the Fiscal Analysis, they will represent a significant investment. While the driver for the Jordan Lake rules is the need to reduce nitrogen and phosphorus pollution, it would be a shame to spend this much money without also obtaining the larger benefits of healthier floodplains and stream systems. The scientists and engineers who have developed retrofit techniques are very clear that retrofits are most productive when conducted within the framework of watershed restoration. The proposed existing development rule gives local governments three years to survey their jurisdictions and develop plans. To the extent that local governments layer watershed restoration goals into these plans, they will receive much greater returns on their investments. A 'certainty' based approach, with the EMC mandating a specific list of BMPs, could only achieve these complex, networked benefits by accident.

***Retrofit reductions can be achieved with lower costs than the Fiscal Analysis suggests.***

Even if the EMC chooses not to require specific BMPs, we can appreciate that the EMC wants to know that it will be possible for local governments to put together plans that can ultimately achieve reductions without bankrupting local coffers. Local governments have expressed great angst over the estimated costs for retrofits in the Fiscal Analysis. We think the estimates in the Analysis have been misunderstood, and that local governments have good options for meeting the proposed rule requirements, and achieving the required reductions, at much lower cost.

*The Fiscal Analysis considers too narrow a list of retrofit BMPs.*

The Fiscal Analysis discusses 12 BMPs: stormwater wetlands, bioretention areas, wet detention basins, dry detention basins, grassed swales, filters strips with level spreaders; infiltration devices; manufactured BMP systems; buffers with level spreaders; permeable pavement; rooftop runoff management; and sand filters.[6] Of these, the Analysis builds its cost estimate largely around stormwater wetlands (30% of projects) and grass swales (27% of projects).[7] The Analysis assumes no use of manufactured BMPs, permeable pavement, or rooftop runoff management. In addition, the Analysis omits any mention of such non-structural approaches as street sweeping or locally-adopted limits on the use of lawn fertilizers. As the Analysis acknowledges, the omitted BMPs would likely result in much cheaper cost estimates for total retrofit costs.

To see that these alternative BMPs are indeed viable, it is worth considering several more closely.

Restrictions on residential fertilizer use. The fastest, cheapest approach for local governments to reduce their loadings from existing development will be to enact local ordinances limiting use of residential lawns fertilizers. The Jordan Lake reduction allocations are built around estimated loading rates for categories of land uses, not detailed analyses of source composition. However, studies elsewhere in the nation have suggested that the top sources for phosphorus from developed landscapes are fertilizers, erosion, and decaying vegetable matter. The top sources of nitrogen are fertilizers, vegetable matter, and atmospheric deposition (including vehicle emissions). A study of two residential neighborhoods in Minnesota found that runoff from lawns accounted for 50% - 60% of phosphorus loadings; in contrast, streets accounted for about 25% and driveways just 10%.[8] Limiting fertilizer use on residential lawns takes the most efficient possible approach – pollution prevention – to reduce loadings into Jordan Lake.

Several cities and counties across the nation have done this, including Dane County, Wisconsin (2004); Ann Arbor, Michigan (2006); Sarasota County, Florida (2007); Commerce township, Michigan (2004); and St. John County, Florida (2007). Minnesota has enacted a statewide law (2002), while New Jersey has

[6] Fiscal Analysis, Table 5.7, Existing Development: Per BMP Cumulative Cost, at 63.
[7] Fiscal Analysis, Tables 5.8 & 5.9, Baseline BMP TN and TP Efficiency, at 65.
[8] R. J. Waschbusch and W. R. Selbig, USGS; R.T. Bannerman, WI DENR, Sources of Phosphorus in Stormwater and Street Dirt from Two Urban Residential Basins in Madison, Wisconsin, 1994-95, at 26.

issued a model ordinance for its local governments (2006).[9] Some of the ordinances ban phosphorus-containing fertilizers (or allow application of phosphorus only with a variance); others restrict use of any fertilizer during certain months of the year; most apply to residential lawns and exempt gardens and nurseries. While local governments can choose the approach they prefer, the EMC may need to help local governments figure out what restrictions will secure the greatest demonstrable nutrient loading reductions. We recommend that the EMC ask DWQ to develop a model fertilizer ordinance for local governments in the Jordan Lake watershed.

There is also a minor, secondary reason for the EMC to favor residential fertilizer restrictions as a control strategy for existing development. At an earlier stage in the rulemaking process, some local governments alleged that rapidly curbing nitrogen loadings could trigger an explosion of toxic, blue-green, nitrogen-fixing algae. This danger was discussed and largely put to rest in the TMDL submitted to EPA.[10] However, to the extent that the EMC harbors any lingering concern, the adoption of ordinances allowing only no-phosphorus fertilizers would result in rapid decreases of phosphorus loadings, protecting the nitrogen/phosphorus balance in the lake.

Street sweeping. Local governments can take a significant bite out of nitrogen loadings with street sweeping programs. There are three basic kinds of street-sweeping machines: vacuum assisted, regenerative air, and mechanical. A study in Montgomery County Maryland found that weekly sweeping by a vacuum assisted sweeper ($240,000 to $310,000 capital cost per machine) reduced nitrogen loadings from a residential neighborhood by 62%; a regenerative air sweeper ($120,00 per machine) reduced nitrogen loadings by 51%; and even a mechanical sweeper reduced nitrogen loadings by 24%. Sweeping monthly still yielded 60% of the weekly reductions.[11]

Rain barrels. A number of Northeastern and Northcentral cities have explored use of rain barrels to reduce combined sewer overflows (CSOs) and cut wastewater treatment costs. Some of the programs have found that rain barrels could help prevent CSOs; others found that the rain barrels were simply overwhelmed in heavy rains, but greatly reduced flows from smaller rains.[12] As a rule of thumb, a half inch of rain on a 1000 sq foot roof will yield roughly 625 gallons of water. A first glance that may seem like too much to be captured by one or two 75 gallon rain barrels per participating residence. However, many houses already send some roof runoff to grassy areas or garden beds to filter into the ground; for stormwater control, the key downspouts to catch are those draining onto such impervious surfaces as driveways.

The Nine Mile Watershed Association, in Pittsburgh, Pennsylvania, has had success with a subsidized rain barrel program for residential properties: the program, which sells rain barrels to willing landowners at slightly below cost, has achieved a 40% participation rate. The Association estimates that with 40% residential and commercial participation, the program would cut annual stormwater runoff in the basin by 11%. An unlikely 100% participation would cut annual runoff by 27%.[13]

One objection sometimes raised to rain barrels as a CSO strategy is that, to capture runoff, barrels must be drained between storms.[14] In the context of nutrient reduction, this is less of an issue. As we have seen over the last decade, nutrient problems are worst in Jordan Lake and its tributaries during periods of drought; those are the times owners are most likely to drain their barrels to water lawns and gardens. If

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[9] Copies of the various ordinances are all attached. In addition, a helpful discussion of the St. John ordinance is available at http://www.coj.net/Mayor/River+Accord/Fertilzer+Ordinance.htm, and of the Sarasota ordinance at http://www.co.sarasota.fl.us/EnvironmentalServices/Water/SurfaceWater/Fertilizer.asp

[10] Jordan Phase I TMDL, at 47- 48.

[11] Meosotis C. Curtis, MD DEP, Street Sweeping for Nutrient Removal, February 2002 (attached).

[12] Karen Sands and Thomas Chapman, Milwaukee Metropolitan Sewerage District, Rain Barrels – Truth or Consequences, in 2003 National Conference, at 390 (attached).

[13] Nine Mile Watershed Association, Rain Barrel Initiative, Evaluation Phase, at 26-27 (attached).

[14] Department of Environmental Programs, Metropolitan Washington COG, Combined Sewer Overflow Rooftop Type Analysis and Rain Barrel Demonstration Project, December 2001, at 23 (attached).

owners fail to drain barrels as frequently during rainy periods, that is probably all right, as higher flows entering the river system will keep concentrations of nutrients lower.

Bank stabilization. As noted above, erosion of sediment is a significant source of phosphorus loadings. The US Army Corps of Engineers' Environmental Laboratory has documented significant reductions in phosphorus loadings as a result of streambank stabilization.[15] In the Jordan Lake watershed, bank stabilization and stream restoration offers great potential for local governments to meet reduction allocations while also generating other benefits, including reducing damage to municipal infrastructure and restoration of urban and suburban fish and wildlife habitat. It also offers the prospect of cutting local costs, as numerous environmental groups, service organizations, and churches are likely to be willing to provide free labor and perhaps voluntary financial support to restore nearby streams, if the local government can provide coordination and leadership.

Bank stabilization and stream restoration also offer a way around one bugaboo raised by some local governments – that EPA will not allow them to build ponds in existing streams. There are sound reasons for EPA's policy; but that policy will not block efforts to convert a concrete channel back into a natural stream, even if the project includes some baffles and rock weirs that aren't strictly necessary from a restoration point of view but help remove additional nutrients.

We are certain there are other viable approaches to retrofits. We also think that local governments, particularly if they are assisted by state guidance, are quite capable of documenting the nutrient reductions that will result from a package of structural and nonstructural BMPs. Techniques used by other local governments have included paper modeling; scaling up from the results of six-month pilot programs (easy to accomplish within the three year planning period offered by the rule); or, best of all, on the ground comparison of similarly situation neighborhoods where one neighborhood adopts the BMP and the other does not. A model as well as a helpful source of information for many local governments may be the stormwater plan developed by the City of Portland in 2006, which reviews multiple structure and nonstructural options and discussed the various benefits and challenges associated with each.[16] Most of the local governments in the Jordan Lake watershed will not need to develop this kind of detailed analysis – but the fact that other governments have already done it will simplify their challenge.

So how did we get here? If all of these approaches to retrofit are viable, why did the Fiscal Analysis overlook them? The answer is that we're in the middle of a conceptual transition. The rules are on the leading side of that transition, while the Analysis is lagging on the back end. It's easiest to see this in the context of stormwater controls on new development: for the last several years, knowledgeable builders and consultants have pointed out that low impact development (LID) techniques can achieve far better environmental results, at lower cost, than traditional structural controls. Yet, the existing regulatory programs are built around engineering standards, and as the regulatory programs have moved to comply with Phase II, inertia has consistently resulted in standards that favor structural controls, except where creative staff and decision makers can break free and consciously build in flexibility for LID. The challenge with retrofits is the same; indeed, many of the cheapest retrofits are LID practices. They clearly perform better than ponderous structural controls – but the literature documenting the cost and nutrient-removal performance of structural controls is more abundant. DWQ staff who wrote the Fiscal Analysis were explicit that their analysis overweighted structural approaches because that data was widely available, and that the resulting cost estimates were inflated.[17] Once made public, however, those cost estimates have taken on a life of their own, and have lost the qualifying small print. The key for retrofits –

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[15] Lisa C. Hubbard, David S. Biedenharn, and Steven L. Ashby, Assessment of Environmental and Economic Benefits Associated with Streambank Stabilization and Phosphorus Retention, ERDC WQTN-AM-14, May 2003 (attached).

[16] City of Portland, Effectiveness Evaluation of Best Management Practices for Stormwater Management in Portland, Oregon, February 2006. The evaluation includes numerous appendices and a remarkable spreadsheet that evaluates the costs and benefits of both structural and nonstructural BMPs (attached).

[17] "While the Division is working with local governments to develop load reduction estimates for a range of more cost-effective, innovative management practices, these calculations assume the use of only conventional stormwater BMPs. This assumption errs in favor of higher costs." Fiscal Analysis, at 55.

as regulators have discovered with controls on new development – is to allow the flexibility for local governments to experiment with the many nonstructural approaches, with the only requirement that, at the end of the day, the BMPs must deliver the required nutrient reductions. That combination of freedom and accountability is the best way for North Carolina to make the transition to widespread use of LID techniques for both new development and retrofits. It is well served by the proposed rules, notwithstanding the overheated responses generated by the Fiscal Analysis.

*The Fiscal Analysis may overestimate the cost of some structural BMPs.*

Even for conventional, structural BMPs, we believe that the Fiscal Analysis overestimates costs.

One way it does this is by including unnecessary land acquisition costs. The Fiscal Analysis assumes that *all* structural BMPs will include a cost of $77,912 per acre of land occupied by the BMP; the land cost comprises 75% of the estimated cost of stormwater wetlands; 73% of the estimated costs of grass swales; and 26% of the estimated cost of bioretention areas. But, depending on where the project is located, the local government may not need to condemn or acquire land. For example, the City of Burnsville, MN, reduced runoff from a neighborhood by 90% by building a series of rain gardens in the front yards of willing residents (80% of residents wanted to participate and have continued to maintain their gardens).[18] Maps of the project indicate that virtually all the rain gardens were in fact located within the 15 foot city right of way next to neighborhood roads. This project illustrates two factors that may eliminate land costs: broad willingness of property owners to welcome construction of a rain garden as an amenity; and existing rights of way that may allow a local government to build small retrofits without having to resort to condemnation.

Retrofitting old stormwater control structures may also avoid land acquisition costs. Many development projects built in the 1970s and 1980s relied on stormwater detention basins geared to the 10-year, 25-year, or even 50-year storms. Many of these basins were not designed to slow or treat runoff from smaller storms, so retrofitting these basins can yield significant gains in water quality. Since the land is already part of a stormwater control structure, the local government does not need to purchase or condemn the property. We do not know how many of these structures are present in urbanized areas of the Jordan Lake watershed; local governments could presumably identify them during the three years of planning allowed by the proposed rule. To the extent that local governments have not maintained records of where these structures are, they almost certainly have not maintained them. So, a side benefit of retrofitting existing basins is the prospect of integrating them into the local governments' maintenance plans being developed as a part of Phase II.

We also have doubts about the costs assigned to the least competitive BMPs (on a $/pound of nutrient removed basis): sand filters. While sand filters are never likely to be used to catch runoff from a very large area, they can remove nutrients from 'hot spots' quite effectively while occupying a small surface area. Washington, North Carolina's 2004 stormwater plan – approved by the EMC as a part of the city's compliance with the Tar-Pamlico nutrient rules – estimates that sand filters can achieve a 35% nitrogen reduction and 45% phosphorus reduction.[19] EPA notes that there are three main types of sand filters: the Austin style; the Washington, DC, underground filter; and the Delaware style filter. The Fiscal Analysis offers a single cost estimate of $56,997 per BMP, with a physical area of .2 acres, treating runoff from 1.2 acres.[20] However, other sources, adjusted to 2006 dollars, offer lower cost estimates: $23,000/ acre of impervious surface treated (Austin style, less than two acres treated); $6,000/ acre (Austin style, more than 5 acres treated); $8,000 to $13,000/ acre (Washington, DC style); or, finally, $13,500/ acre (Delaware style).[21]

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[18] Barr Engineering Company, Burnsville Stormwater Retrofit Study, June 2006 (attached).
[19] City of Washington, Stormwater Management Program for Nutrient Control, January 27, 2004, at 8 (attached).
[20] Fiscal Analysis, Table 5.7, Per-BMP Cumulative Cost, at 63; Tables 5.8 & 5.9, Baseline BMP TN and TP Efficiency, at 65.
[21] NC Division of Pollution Prevention & Environmental Assistance, Sand and Organic Filters, Table 4, http://www.p2pays.org/ref/41/40465.pdf (attached).

*Local governments may not have to divert retrofit costs from other civic priorities.*

Fortunately, the costs of retrofits do not necessarily have to divert resources from other local budget priorities. Many jurisdictions in the watershed already have stormwater authorities that charge stormwater fees; most others will eventually establish stormwater fee now that they are covered by Phase II. The City of Portland Oregon – which has had stormwater fees since 1973 – recently launched a program to reward property owners who control runoff onsite by reducing their stormwater fees.[22]

*Estimates of retrofit costs have not accounted for collateral benefits.*

Several retrofit BMPs offer significant collateral benefits, with the potential to create savings or positive revenue streams for local governments or private actors. For example, one company in Pennsylvania has developed a patented 'green solar canopy' that can be built over parking lots. Not only does the canopy reduce stormwater runoff; it also generates solar electricity, which can be used to power local uses (parking lot lighting or electricity for a corporate building that uses net metering).[23] Green roofs are widely used in Germany (over 10 million square feet are installed each year), and have yielded significant energy savings while simultaneously reducing runoff. A green roof built over a public library in downtown Minneapolis is estimated to have had a payback period of just 7 years.[24]

As a final comment on retrofits, for all the challenges that lie ahead, it is worth noting that the local governments in the Jordan Lake watershed face a lighter burden from retrofits than local governments in some other states. Fearful local governments have described the retrofit rule as 'unprecedented'.[25] That may be true in North Carolina, but retrofit requirements are not unprecedented elsewhere: starting in 2003, the State of Wisconsin required over 200 local governments to begin retrofit projects as a part of their Phase II NPDES permits, with the mandate that they achieve a 40% reduction in total suspended solids (TSS) by 2013.[26]

**Riparian buffers**

During the comment period, local governments have objected vociferously to the 'underfunded mandates' created by the proposed buffer rule. The NC Conservation Network strongly supports inclusion of buffer protections – that is clearly necessary to prevent even grater nutrient loadings from reaching the Lake. However, we do not have a strong preference for either state or local enforcement. Many of the local governments in the Jordan watershed already have much stronger buffer rules on the books; we urge the EMC to ensure that the Jordan watershed buffer rule does not in any way preempt stronger local requirements. We suspect that, whether the state or local governments implement the rules, more resources will be needed to ensure meaningful enforcement.

**Conclusion**

One can debate whether the U.S. Army Corps of Engineers should have built Jordan Lake in the first place. However, the lake is with us, and will be for the foreseeable future. Roughly 460,000 people now

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[22] City of Portland, Clean River Rewards, Interim Rules, October 2006 (attached).
[23] See, Cahill Associates, http://www.thcahill.com/canopy.html (visited Sept. 14, 2007).
[24] Minnesota Sustainable Communities Network, Green Roofs, http://www.nextstep.state.mn.us/res_detail.cfm?id=512 (visited Sept. 14, 2007). Another green roof company with a long list of successful projects is GreenGrid, http://www.greengridroofs.com/greenroofs.htm (visited Sept. 14, 2007).
[25] PTCOG slideshow, slides 2, 8, 23, 41, 55, 58, 60.
[26] Roger Bannerman, Greg Fries, and Judy Horwatich, Source Area and Regional Storm Water Treatment Practices: Options for Achieving Phase II Retrofit Requirements in Wisconsin, in Proceedings of the National Conference on Urban Stormwater: Enhancing Programs at the Local Level, February 17- 20, 2003 [2003 National Conference], at 1 (attached).

rely on Jordan Lake for drinking water; many more visit, swim, fish, or play in the lake. The package of proposed Jordan Lake rules take the steps required by the Clean Water Act to restore the health of this large waterbody, and we urge the EMC to adopt the package of rules with the strengthening changes outlined above.

Thank you for your consideration of these comments. If I can answer any questions, or provide more detailed explanation of any of the points raised in this letter, please contact me at 919-828-9595, or grady@ncconservationnetwork.org

Sincerely,

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