Meeting Summary
Upper Neuse Site Evaluation Tool Task Group
December 9, 2003

<u>Attending</u>
John Cox, Durham
Betsy Pearce, Cary
Rich Gannon, DWQ
Bill Hunt, NCSU
Mike Coughlin, Wake County
Chris Dreps, UNRBA
Mark Senior, Raleigh
Perry Sugg, Orange County
Terry Stephens, Homebuilders Association (Builder)
Kimberly Brewer, Tetra Tech
Scott Job, Tetra Tech

Chris Dreps, Director of the Upper Neuse River Basin Association (UNRBA), opened the meeting describing the need for a site evaluation tool in implementing recommendations from the Upper Neuse Watershed Plan. He said that the state had awarded the UNRBA a 319 grant to a modify tool currently used by the Town of Huntersville/Mecklenburg County. The UNRBA has contracted with Tetra Tech, developers of the Mecklenburg County model, to assist in development of the Upper Neuse SET. He said that the UNRBA Technical Advisory Committee had established this task force to provide guidance on the SET development based on members' state and local experience with stormwater BMPs.

Upper Neuse SET Menu of Best Management Practices (BMPs)
The first agenda topic question was, "Which BMPs should the Upper Neuse SET menu include?" Kimberly Brewer from Tetra Tech explained that the SET would include a set of BMPs from which the user can choose. Each BMP will have built-in assumptions, such as pollutant removal efficiencies, which will drive the spreadsheet model. The SET will also allow the user to apply and define BMPs not on the list; however, supporting information must be provided to and approved by the local government before such BMPs can be used. Importantly, as new technologies are developed in the future and better information generated about exiting technologies, the SET can be easily adapted to add other BMPs to the menu (or revise assumptions about BMPs already on the menu).

As a starting point for a menu of BMPs, Kimberly asked the group to review Table 1 from the handout, which listed BMPs in the existing SET model, and to discuss which BMPs should be added to or deleted from the list. Several members of the group asked about design specifications associated with the BMP menu. Kimberly said that local governments often have a local design manual and/or a state manual that they reference. Bill Hunt from NCSU said that the state stormwater regulations cite the State of North Carolina and State of Maryland stormwater design manuals. Engineers must adhere to the manuals to get "credit." Therefore, the group stressed that any BMP on the SET menu

needed to be in one of these state manuals. There is currently a process for updating the NC manual; when it is released, there will be a follow-up addendum on bioretention and permeable pavement.

The group discussed the pros and cons of lumping options into broad categories v splitting them out into numerous subcategories or designs (e.g. wetland and pocket wetland, trapezoidal and v notch grass swale). Terry Stephens of the Homebuilders Association and Perry Sugg of Orange County cautioned against lumping the BMPs into broad categories. Terry said from a developer's perspective, it's good to have as many options as possible on the menu to get engineers and architects to think about the different approaches.

Following are main points regarding modifications to the list of BMPs:

1. *Research enhanced swale*. The group wanted a more clear definition of enhanced swale. Members asked if such swales are being used in areas with clay soils, where there is a potential for clogging. They also asked if the enhanced swale was in the NC or MD stormwater manual. Scott Job of Tetra Tech said he believed it was in the GA stormwater manual, but was not sure about the NC or MD manual. They asked Tetra Tech to research this BMP more, and if the answer to one or both of the questions above is "no", then table the BMP until more is known about design and performance.
2. *Review buffer assumptions*. In the Neuse rules, the required buffer does not receive pollution removal credit on a site design basis. The buffer removal rate was calculated into the TMDL. Only buffer area beyond the minimum Neuse Rule requirement can receive credit in the SET. The group asked if there was a linear relationship in removal rates. Scott said research had shown that the relationship is not linear (i.e., 100 ft. buffers do not provide twice the removal of 50 ft. buffers) and that the SET was programmed to account for the nonlinear relationship. The consensus was to keep buffers as a BMP, but to program the tool so that it gives no credit for the required Neuse Rule buffer area. Several task group members from local governments said they require maintenance of diffuse flow into the buffer (i.e., requiring level spreader). They asked if this was assumed for the SET and incorporated into assumptions about removal efficiencies. Kimberly said she believed diffuse flow was assumed, but that Tetra Tech would check these assumptions.
3. *Add permeable pavement and research assumptions about removal efficiencies*. Mark Senior of Raleigh recommended that permeable pavement be added to the BMP menu. He said that Raleigh is already using permeable pavement to reduce impervious area. Bill said that the state is adding permeable pavement to the list of approved BMPs. Bill stressed that it should be used in stable areas such as those experiencing redevelopment or infill. In actively developing areas, the upstream land disturbance can wash solids onto the pavement and clog it (i.e., removing its infiltration ability). Kimberly said the SET model can ask, "Is the project in a stabilized area (e.g., redevelopment or infill), and allow the permeable pavement BMP to "pop up" as an option only when the answer is "yes". The

group asked Tetra Tech to research the pollutant removal efficiencies of permeable pavement to determine if such credit should be given to this BMP. They also asked for more research on the hydrology credit. Two types of permeable pavement were discussed: paving blocks used in Raleigh and porous asphalt with underground storage and underdrains (e.g., Cahill designs) used in Chapel Hill. Bill said that he is monitoring the Chapel Hill parking lots and they are performing very well.

4. *Merge pocket wetland with stormwater wetland*. The group discussed the differences between the drainage area required per design manuals for a large wetland and a one-acre (or less) drainage areas served by a small pocket wetland. Bill said the design principles and removal efficiencies should be the same for both, and recommended having one category of wetland, which says "including pocket wetlands".

5. *Vegetated filter strip*. Add "or wide grass strip"

6. *Add cisterns and research reasonable assumptions to use about pollutant removal and hydrology potentia*l. John and Mark recommended adding cisterns to the menu of options. John said that water reuse/conservation will be increasingly important, making cisterns a more important stormwater management and conservation technique. The group raised questions about the proper credits to use in the model. For example, what if the first ½" is captured from the roof (or first flush). Is that 100% removal? What if it's used for irrigation? For pollutant removal and hydrology, what if you have back-to-back rainfalls when the cistern is still full; how would you account for the percentage of "bypass". Bill said he would work with Tetra Tech in coming up with reasonable assumptions. Alternatively, this may have to be a user-defined BMP.

7. *Keep green roofs, but work with Bill on assumptions*. Bill indicated that recent research is showing nitrogen export from green roofs, at least early while the plants are getting established. Kimberly said in ultra-urban areas, local governments might need to use green roofs for the peak flow and volume control. The group agreed to keep green roofs on the menu, but to work with Bill on the appropriate nitrogen removal or export assumptions.

8. *Delete inlet/manhole devices*. The group discussed the variety of proprietary BMPs and their varied performance. The state has a Technical Review Committee for Proprietary Devices and will soon release a technical memorandum with guidance. Mark said that inlet and manhole devices should be applied in the "BMP user defined" option in the SET using guidance from the state. The group concurred.

The remaining BMPs listed in Table 1 (provided at the meeting) are to be included in the Upper Neuse SET Menu of BMPs.

Guidance on Removal Efficiency Assumptions

Kimberly said that Tetra Tech developed removal efficiency assumptions more than a year ago for the Mecklenburg County SET using the best available information in the literature and best professional judgment. When developing the SET for the Town of

Cary project—located in the Neuse Basin— Tetra Tech reviewed the removal efficiency assumptions from the state's Neuse and Tar Pamlico Model Stormwater Programs. Where the Mecklenburg SET and State assumptions differed, the Town asked Tetra Tech to use the state's assumptions so as to be consistent with the state and not endanger state approval of the project. Generally, for the Cary SET, Tetra Tech used the Tar-Pamlico assumptions rather than the Neuse assumptions because the former were more up-to-date.

New Research
Kimberly asked the group if it had additional or new research to share, which would provide more technically defensible assumptions than those in the Mecklenburg or Cary SET models.

Bill summarized his most recent research on bioretention cells in Chapel Hill and Greensboro. He said that the analysis is conducted "in the field" with stormwater runoff as opposed to using stormwater mixed in a laboratory and then pumped through a bioretention cell in the field as done in other studies. The analysis is showing 40% removal for nitrogen (annual average). Bill recommends assuming 35% for now to be conservative (this is what the state will use for Neuse and Tar-Pamlico programs), but believes future research will likely show 40% to 45% removal of nitrogen. He indicated that bioretention cells can export phosphorus initially, but that the cells should "work fine" in removing phosphorus over a 20-year lifespan. His research shows bioretention cells must be constructed with fill or conditioned soil having low phosphorus content. Where soils are used with high P content, the cells export phosphorus. In Chapel Hill where the fill soil had low P content, the bioretention cells consistently achieve a 62% removal of phosphorus. Kimberly said the SET could query the user about the P content of the soil. If the soil is low in P, then the model would use a better removal efficiency than if it is high. Bill recommended using a conservative estimate for the high estimate, such as 45% removal efficiency. The group stressed that the warning about fill soils with high P content be included in the state's design manual or follow-up addenda, and that the manual should require the testing of fill soils for P. Bill recommended that the bioretention removal of TSS (as well as the constructed wetland) reflect the same assumption as the assumption used for wet ponds.

Bill next discussed research conducted on wet ponds for TSS removal. Over the past two years at numerous sites, he has found that the ponds remove 65% TSS rather than 85%, as widely assumed. Prior to this meeting, John Cox asked Bradley Bennett if the state would be changing its assumption about wet pond removal based on this research. Bradley indicated that changing the assumption would create too much havoc with local stormwater programs and developers. Since it is assumed that building one wet pond achieves the standard of 85% removal of TSS, if the assumption is changed to 65% removal, then a series of two or more ponds, or multiple BMPs would need to be built to achieve the 85% removal standard. Several local government representatives in the group indicated they would like to use the assumption based on the best technical information, rather than perpetuating a "myth" about the performance of ponds. However, Chris Dreps said it might put the UNRBA in a difficult position if it assumed 65% in the SET, requiring multiple ponds, while the state continues to assume 85%, requiring only one

pond. This kind of inconsistency may confuse the issue, especially among local governments without stormwater specialists on staff. John Cox and Rich Gannon brought up the new Phase II stormwater requirement to "control and treat the first inch of runoff" from the entire site. This new requirement, if it goes into effect, will necessitate much larger ponds. Bill estimated 12% of the project site would need to be dedicated to a wet pond. This size pond may be able to achieve 85% removal of TSS—however no one knows yet because it would be a new pond design. The group wanted more time to develop a recommendation on the assumption for TSS removal for wetpond. Bill said he recommended that the stormwater wetlands and bioretention have the same TSS assumption as wet ponds (i.e., all have 65% or all have 85% removal efficiencies).

Additional Guidance On Removal Efficiencies

Grass Swales – Rich said that he and Bradley Bennett would be reconciling assumptions on removal efficiencies for nitrogen and sending out a Technical Memorandum within weeks. The group said to use the figures from the state in the Upper Neuse SET.

Stormwater Wetlands – use the Town of Cary's assumptions for N and P in Table 1.

Dry Detention- two jurisdictions said that they did not give pollutant removal credit to dry detention, while both the Mecklenburg and Cary SETs show removal for TSS, TN, TP, and FC. Bill said that his research showed that detention did have pollutant removal potential. The group asked Tetra Tech to look more into whether dry detention should receive credit, and if so, how much.

Cisterns and Permeable Pavement – Bill said he would provide more guidance to the group in the next month or two.

Chris said that he had asked Bradley Bennett, "Is there a problem with using assumption from more up-to-date research in the Upper Neuse SET? Would formal state approval be required?" Bradley said the Neuse and Tar-Pamlico Model Stormwater Program was never intended to be set in stone. The state intended to update its assumptions periodically. He said if the Upper Neuse Task Force wished to use assumptions based on more recent research, it just needs to document the basis for its recommendations.

Next Steps

- Tetra Tech will research the questions noted above, working closely with Bill Hunt.
- Rich Gannon and Bradley Bennett will be forwarding a Technical Memorandum on updated BMP removal efficiencies for the Neuse and Tar-Pamlico Model Stormwater Programs.
- The next meeting of this Task Force will be scheduled for January. The UNRBA and Tetra Tech will update the group on new information regarding removal efficiencies and begin the discussion regarding how the Upper Neuse SET can be used to track hydrology targets.