



Memorandum

To: Stormwater Management Task Force

From: CDM

Date: May 24, 2006

Subject: Wake County Stormwater Task Force Meeting #3 – Issues Module

On May 18, 2006, CDM and Wake County staff facilitated the third meeting for the Wake County Stormwater Management Task Force. Attendees were provided with meeting materials, including a copy of the agenda, a copy of the PowerPoint presentation, a set of data tables, and a map of the stormwater system elements. All meeting materials can be found on the Task Force website at <http://www.wakegov.com/environment/stormwater/>.

Follow-Up Topic - Impervious Surface

The meeting began with a welcome by Rick Rowe, Wake County Environmental Services Director. David Mason from CDM was introduced to lead a discussion on impervious surface in Wake County. The topic was developed from a question at the previous meeting regarding the amount of impervious surface in the County relative to different land use categories.

Mr. Mason began the presentation with a description of the major land areas in the County. Wake County is approximately 860 square miles in area. 250 square miles of the County lies within a water supply watershed (WSW). For the purposes of this discussion, Mr. Mason stated that the land in the water supply watershed would not be included in the calculations since impervious surface controls already exist in those areas.

Mr. Mason presented a pie chart of the total land area breakdown in Wake County. The data supporting the pie chart can be found in Table 1 of the handouts. Farming represents the largest portion of land in the County (outside of the WSW) at 24 percent while residential land with parcels less than 10 acres represents 20 percent of the land. 14 percent of the County is classified as vacant. It is anticipated that most of the future development will occur by converting farm land and developing vacant land.

Three major land uses were chosen for the impervious surface analysis: 1) single family residential (only parcels less than 1.5 acres), 2) non-residential (includes commercial,

industrial, apartments, and condos), and 3) roads. Assumptions on impervious surface for each category were made in order to develop a county-wide estimate.

While single family residential represented approximately 20 percent (57,000 acres) of the total land area in the County, the impervious surface represented less than 11,000 acres. Meanwhile, non-residential property totaled 28,000 acres of the County (8 percent) and nearly 20,000 acres of impervious area. Roads represent approximately 13,000 acres of impervious area. A complete breakdown of this data is found in Table 2 of the handouts.

It was also noted that tax exempt parcels represented nearly 10 percent of the total land area in the County. These areas can include some highly impervious properties such as state and local government, schools, and churches. However, this category also includes parks, greenways, and natural areas which do not contribute significant amounts of impervious area. Because of the wide variety of uses in this category, an estimate of total impervious area was not made. Table 3 provides a breakdown of the land uses within this category, however.

Lastly, Mr. Mason presented information on the runoff potential of various land uses based on the Soil Conservation Service (SCS) Curve Number (CN) method. Curve numbers are assigned to different land uses as an indicator of how much rainfall may be converted to runoff during a storm event. Woods/Forest have a low CN value of 60 while impervious surfaces have a high CN value of 98. The higher number indicates a higher potential for runoff. For example, a two-year storm (3.6 inches of rain in 24-hours) produces only 0.58 inches of runoff when it falls on woods/forest but produces 3.37 inches when falling on pavement (nearly six-times the amount).

The CN values were applied to a case study in the Mine Creek drainage basin to estimate the impact of converting an undeveloped drainage basin (assuming farmland) to a developed/build-out condition. The result was a 79% increase in total runoff volume for the 2-year design storm. The data and calculations to support the case study can be found in Table 4 of the handouts. The change in runoff for this case study was also performed for larger storm events (10-yr, 25-yr, and 100-yr) to show the relative change in runoff volume. This change in runoff volume is source of burden on our system that local stormwater managers spend money trying to control.

At the conclusion of Mr. Mason's presentation, the following comments were made by the task force members:

- We need to incorporate stormwater drainage issues into subdivision design, which can provide high impact and is cost effective.
- What is the breakdown of impervious area assumed for each residential class in the SCS Curve Number method (**CDM Action Item**)?

- Development regulations don't address the impacts of stripping the soil bare before construction.
- A task force member read an article that agriculture is the primary source of nitrogen pollution in North Carolina. She wanted to know if we are trading one problem for another when we convert agriculture land to developed land (**CDM Action Item – research**).

What is Level of Service?

Scott McClelland of CDM discussed the concept of level of service (LOS). Mr. McClelland explained that the level of service for stormwater is similar to levels of service for other infrastructure. As an example, citizens have expectations for how often their trash will be picked up, how long they are sitting in traffic, and how clean their water is. In regards to stormwater, citizens have expectations on how often it will flood and how much erosion will occur. Primarily, level of service is defined by customer expectations and regulatory requirements. Regulatory requirements usually establish the minimum level of service allowed, but customer expectations usually define the level at which the service will be provided and at what cost.

Mr. McClelland presented a few examples of stormwater levels of service related to both customer expectations (roadway flooding) and regulatory compliance (floodplain management). Following the level of service discussion, Mr. McClelland opened the floor for discussion, asking task force members to provide some expectations for stormwater services. The following is a list of responses:

- At the very least, we should aim to control increases in stormwater volume. It's a great first step and gets us out of our own way.
- We must, at a minimum, control impacts to streams. It will enhance water quality and support quality of life. Also, streams hold an aesthetic value. We can tolerate some minor flooding of streams.
- Actions can be taken at the local level by residents, property owners, and homeowner's associations. The responsibility shouldn't fall solely on the government.
- Education must be an important part of the equation. We need to educate property owners that modifications made on their property can affect properties downstream or adjacent to them. Education should be targeted for new development as well as existing development.
- Local governments play a primary role in providing the appropriate level of service. Enforcement of rules needs to be a priority for any plan to work as intended.

- Quantity and quality are both issues that overlap to some degree, but are also two very different beasts. Services need to be provided that deal with both issues.
- The average homeowner is typically concerned with nuisance flooding more than anything else. Most do not have a very good understanding about water quality issues. However, city staff need to concern themselves with both quantity and quality issues. Often, city staff spends a lot of time dealing with customer complaints regarding nuisance flooding.
- The minimum water quality is provided by regulatory mandate. However, the average homeowner isn't concerned with meeting any regulatory minimums.
- The perception of many issues is determined by its visibility. Local fish kills raise awareness for customers, but NPDES permit violations are mostly unnoticed.
- Residents typically have zero tolerance for flooding.

Task Force Survey Results & Perspectives

Brenan Buckley of CDM presented some of the highlights of the task force survey from the first meeting and asked for feedback related to each of the questions. The following sections discuss the question and list the responses from task force members:

How well does the storm drainage system generally work in your area?

Only three percent of respondents believed that the system works perfectly all of the time. 53 percent felt the system worked OK in most storms and 42 percent felt the system backed up water and created adverse flooding conditions. The following comments on this question were provided by the task force members:

- The question was difficult to answer since there was not a clear definition for what was meant by "storm" or "flooding." There can be very different levels of each. Generally, members considered a storm to be 4 to 5 inches or a storm significant enough to cause roadway flooding.
- Customers have a different tolerance for flooding. They may consider differently flooding in a flood plain versus flooding in a drainage easement.
- More staffing may be necessary to address customer complaints. Even if the problem can't be solved, customers are appreciative that a staff person was able to visit them at the project site to hear their concerns.

How would you generally rate the maintenance of the storm drainage system within your area?

Only three percent of respondents felt that the stormwater system was very clean and very well maintained. 50 percent felt the system was adequately maintained in most cases and 39 percent felt the system needed more frequent maintenance. The following comments on this question were provided by the task force members:

- It's common to see yard debris clogging catch basins and culverts. Education is necessary for homeowners to inform them about their responsibility in maintaining the system.
- Generally, the current level of maintenance is not adequate.
- Education should focus on system design criteria and day-to-day behavior. Residents should understand what the limits of the system are and what their role is.
- BMP maintenance for individual property owners and homeowner's associations is an issue that requires more education and tighter enforcement by the local governments.

How well are erosion and sedimentation controlled during construction?

Zero percent of respondents said that construction sites are always well protected. 34 percent said that construction sites are usually well protected while 50 percent said sites are sometimes unprotected. Nearly 25 percent said that sites were frequently unprotected during construction. The following comments on this question were provided by the task force members:

- The E&S program has good intentions. The rules are capable of doing the job but the enforcement of the program is not adequate.
- Examples of sediment in the streets and in the streams are the basis for judging the program. However, these are just visible indicators. The actual loading on the system from these "spills" may not be significant in the grand scheme.

As the meeting was expiring, Mr. Buckley concluded his portion of the presentation with the results of a survey question regarding good housekeeping practices for residential property owners. Additional survey results not covered at this meeting will be presented at a future meeting where appropriate.

Next Meeting

Mr. Buckley concluded the meeting with a summary of proposed activities and expected outcomes for the next meeting. Proposed activities include final comments on the task force survey and a discussion session of stormwater issues from various perspectives, including an elected official, a stormwater manager, a developer and potentially others.

The next meeting is scheduled for June 15, 2006 at 6:00pm at the Wake County Office Conference Room (same location as Meeting #3). Dinner will be provided at 5:30pm.

Consultant Action Items

As a part of a future meeting, CDM will address the following question/request:

- Show documentation of impervious surface limits associated with CN value tables.
- Research the contribution of nitrogen from farmland to the Neuse Basin.
- Perform a case study regarding the Neuse Rules. Show how a typical 60-year old development would look compared to a new development that has implemented all of the rules.