



Memorandum

To: Stormwater Management Task Force

From: CDM

Date: June 20, 2006

Subject: Wake County Stormwater Task Force Meeting #4 – Issues Module

On June 15, 2006, CDM and Wake County staff facilitated the fourth 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, and a set of questionnaires for use on each of the case studies presented at the meeting. All meeting materials can be found on the Task Force website at <http://www.wakegov.com/environment/stormwater/>.

The meeting began with a welcome by Commissioner Ken Gardner, Chairman of the Wake County Stormwater Task Force. Mr. Gardner thanked everyone for his or her attendance in spite of the large flooding event that occurred on the prior day (June 14, 2006) as a result of Tropical Storm Alberto. Commissioner Gardner introduced the staff of CDM who would be presenting several case studies to highlight stormwater issues county-wide.

Following Commissioner Gardner's introduction, Brenan Buckley of CDM reviewed the results of the Task Force survey and presented data on typical stormwater complaints. The common themes of the survey results and stormwater complaints were used to develop the types of case studies that would be presented at the meeting. The five case studies included: 1) structural flooding, 2) nuisance flooding, 3) stream quality, 4) sediment and erosion control, and 5) secondary and cumulative impacts. For each case study, the Task Force members were asked to fill out a questionnaire on issues related to the case studies. The responses to these questionnaires will be summarized at the next meeting.

Case Study #1 – Structural Flooding

David Mason of CDM was introduced to present the structural flooding case study. Before discussing the case studies, Mr. Mason presented information related to floodplain mapping in Wake County. He explained that FEMA has recently updated the floodplain maps for the county (in 2004) which were last updated in 1992. County-wide, it is very difficult to make broad assumptions regarding the map changes. However, local examples of floodplain changes were shown. Changes to the floodplain may be from development, errors in the

previous models, or refinement of tools and information used to generate the floodplains. Mr. Mason also explained that floodplain mapping based on future land-use conditions was also performed by FEMA for parts to the County. The future maps were based on county-wide zoning data.

Mr. Mason continued his presentation on three structural flooding examples as elements of the structural flooding case studies. The examples included Crabtree Valley Mall, the Town of Holly Springs (as presented by Heather Keefer with the Town) and Raleigh's Yorkgate Drive project.

Crabtree Valley Mall

Mr. Mason began the Crabtree Valley Mall discussion with a brief overview of the events and data associated with the flooding on June 14, 2006. Across the County, the June 14th storm was estimated to range from a 10-year storm event to more than a 100-year storm event. USGS stream gage data near the mall indicated that local stream flows exceeded the 100-year design storm and were shown to be greater than stream gage information from Hurricane Floyd in 1999.

Aside from the flooding event on June 14th, Mr. Mason also presented a specific drainage issue on the Crabtree Valley Mall property. In the mall parking lot near Sears and Jiffy Lube, two grate inlets are present to capture local drainage. The inlets connect the overland flow to the underground drainage network. At this location, off-site stormwater flow is received from properties located to the north of the mall. As the watershed to the north of the mall has developed, mall managers have seen an increase in the flooding of their parking lot. Flow from the upstream area travels onto mall property, fills the manholes/junction boxes in the parking lots, and spills into the lot (as shown in photos).

The development that has occurred upstream met all regulations at the time plans were approved. New stormwater regulations are more stringent than the regulations at the time of construction and may have been able to minimize some of these issues. The primary topics of discussion for this case study included who is responsible for drainage from upstream development, how do we deal with drainage issues resulting from older regulations, and if there is a fair solution to this problem.

Town of Holly Springs

Heather Keefer with the Town of Holly Springs spoke about a few re-occurring flooding issues in the Town. She spoke of several homes in the Winward Pointe subdivision that regularly flood in larger storm events. Basement and finished floor flooding has occurred in several storm events over the last five to six years. Ms. Keefer stated the turnover at some of the properties is high and that residents are frustrated that notification of flooding is not given for these properties at the time of purchase. Ms. Keefer explained that these properties are not in a FEMA regulated floodplain, so notification is not required.

Due to these types of problems, the Town has adopted stricter regulations regarding stormwater control from residential developments. Also, the Town has developed a stormwater model for some high growth areas and requires developers to model their development within these areas to prove no adverse downstream impacts. Ms. Keefer stated that these solutions have helped minimize some of the impacts from development.

City of Raleigh Yorkgate Drive Storm Drainage Improvements

Mr. Mason continued the structural flooding case studies with a brief description of a current project in the City of Raleigh. CDM is in the process of designing improvements for the drainage system on Yorkgate Drive in North Raleigh. Residents in the 30-year old neighborhood experience crawl space and structural flooding in both small and large storm events depending on their location. The homes have been built in the natural floodplain before floodplain regulations were in place. Also, the natural system has been directed into a local storm sewer system that is undersized for current storm flows. It was estimated that this one isolated issue in the City of Raleigh may cost as much as \$2 million to retrofit.

Question & Answer Session:

- *Is there a requirement for flood insurance if a property is not within a FEMA regulated floodplain?*
No, flood insurance is only required in a FEMA floodplain, which typically represents a stream draining more than 1 square mile.
- *Are the towns required to disclose flood-related issues on private property?* No, towns are not required to disclose any private property information but will do so when asked by property owners.

Case Study #2 – Nuisance Flooding

Mr. Mason continued the presentation with a discussion of nuisance flooding issues. Nuisance flooding was defined as localized flooding on property that does not impact any structures and does not pose any significant public safety threat. Two nuisance flooding examples were presented.

Durant Elementary School

A resident located adjacent to a stream that drains most of Durant Elementary School has sent several complaints to local governments in Wake County. The property owner is concerned about yard flooding in frequent storm events. The flows cause damage to his property and the owner feels it is a safety issue.

The stream drains approximately 10 acres, of which 2.5 acres are impervious. Based on field observations, it was determined that the man-made section of stream adjacent to the property does not have enough capacity to handle upstream flows. It should be noted that the school met all regulations at the time of construction and is not required to provide any stormwater

detention controls. However, it should also be noted that the school was constructed several years before the residential development that is now experiencing "impacts" from the school.

It was noted that this problem might seem minor compared to some of the larger stormwater issues in the county. However, individual property owners are very concerned about such issues and have been demanding a higher level of service related to these problems from both local government stormwater professionals and other city/town/county officials.

Wake Forest Level Spreader

The second example of nuisance flooding was a level spreader located on a residential lot in a Wake Forest subdivision. The level spreader receives runoff from 18.5 acres of residential development that has 6.2 impervious acres. The resident adjacent to the level spreader says that the yard floods in events as small as 1/3rd inches. The flooding damages the property, causes an eye sore, is a potential safety hazard and impacts property values. The Town has been contacted regarding the issues but, due to several other violations by the developer, will not take over maintenance of the system.

The drainage plan for the development meets all design standards and was approved by the local governments. However, the property owner suggests that the system was not installed as designed since it is located in the Neuse Buffer. Also, the property owner said she was not made aware of the level spreader on a portion of her property by the developer at the time of purchase. Dramatic photographs of the drainage problem were presented. The property owner wishes to know who is responsible for the issue and how it should be resolved.

Question & Answer Session:

- *What is the definition of nuisance flooding?* Nuisance flooding is typically defined as flooding that does not impact any structure or does not typically result in a public safety hazard. Nuisance flooding includes small ponding on roadways, yard flooding, local drainage issues, etc.
- *Would towns have been aware that these problems might occur when reviewing and approving development plans?* In many cases, the plan review process would catch many potential nuisance flooding issues, which would be corrected before construction takes place. However, the plan review process is only so effective at catching all of these problems. Also, some nuisance flooding issues result from less stringent regulations of the past (i.e. the plans met the intent of the rule at the time of construction).

Case Study #3 - Stream Quality (Pigeon House Branch)

Mark Senior with the City of Raleigh Stormwater Management Division provided a presentation on the Pigeon House Branch drainage basin, located in downtown Raleigh. Pigeon House was chosen as a case study since it represents impacts from urbanization in a watershed. Pigeon House Branch has been listed on the State's 303(d) list of impaired waters

and has also been designated for a TMDL. The primary pollutants of concern in the 3,200 acre drainage basin are copper, fecal coliforms, and biological integrity. The listed pollution sources are urban runoff/storm sewers and industrial discharges.

Mr. Senior discussed the impacts that urbanization has had on the watershed, including leaking sanitary sewers, brake dust from cars (copper), sediments, illicit discharges from industries, illicit connections from businesses, and pet/animal wastes. The City has been performing monitoring in the basin to help identify the sources of the pollutants of concern in order to help prioritize potential solutions. The monitoring also helps the City track compliance with water quality limits set by the State. Mr. Senior suggested that the limits may be unattainable for such an urban watershed, but that the City has been doing all that it can to help improve water quality in Pigeon House Branch.

Although Pigeon House Branch is one of the most highly urbanized watersheds in Wake County, many other streams in the County have also been listed on the State's 303(d) list for various pollutants. Currently, 94 stream miles in the County have been designated as impaired for their intended uses. Local governments are now charged with developing programs to improve the water quality in these streams to protect habitat and to avoid TMDLs.

Question & Answer Session:

- *Have there been any national studies to identify specific pollution sources in urbanizing areas?* Local studies have been performed in some cases, but Mr. Senior stated that he was not aware of any national studies on this issue.
- *Are illegal connections typically accidental?* Mr. Senior indicated that illegal connections are partly accidental and partly the result of poor plumbing work. He suggested that plumbers sometimes just make the connection to the first pipe they find without identifying the use of the pipe (stormwater, sewer, etc).
- *Many streams on the 303(d) list in the County have "urban runoff" identified as the primary pollution source. What can be done to resolve this?* Mr. Senior suggested the only way to deal with urban runoff completely is to collect, store and treat all the runoff. While some communities have attempted to do this, the solution is very costly and not likely feasible in most areas. He suggested that a better solution is to control impervious area and establish regulations that minimize the impacts of urbanization as much as possible.
- *Is there anything biological remaining in Pigeon House Branch?* Yes. Mr. Senior indicated that you can observe small fish and critters in many portions of Pigeon House Branch. While they may get "washed away" in storm events, they typically return and appear to be very resilient to the conditions.

Case Study #4 - Sedimentation & Erosion Control

Brenan Buckley of CDM presented the fourth case study of the meeting regarding sedimentation and erosion control in the County. Several sources of sediment were listed: 1) upland erosion, 2) land disturbance activities, 3) agricultural/farming operations, 4) developed areas, and 5) streambank erosion. Mr. Buckley provided some data to help assess the relative sediment generation from various sources. Based on the data provided, construction sites generate approximately 800 lbs/acre/year while medium density residential areas generate approximately 290 lbs/acre/year. Sediment from streambank erosion varies greatly depending on the study and may be difficult to assess. However, research suggests that streambank erosion is typically one of the highest producers of sediment in urban streams.

In order to further assess the relative impact of construction sites, Mr. Buckley presented some data regarding sedimentation and erosion control permits across the County. Five local governments in the County operate erosion and sedimentation control programs (Wake County, Raleigh, Cary, Holly Springs, and Apex). Wake County provides this service for themselves and the remaining towns in the County. Currently, there are 2,300 active permits in Wake County with a total disturbed acreage of 15,000, which is approximately 24 square miles or three percent of the County land area.

Mr. Buckley continued his presentation with a comparison of the sediment load generated from these disturbed areas and the potential sediment load from eroding stream banks. Based on an estimated sediment loading of 4.41 tons/acre/year from construction sites, the total load from the 15,000 disturbed acres would be approximately 66,675 tons per year. By assuming an approximate length of 3,275 miles of streams in the County, Mr. Buckley suggested that each linear foot of stream would only need to generate 8 lbs/acre/year to equal the total sediment load from the disturbed areas, which suggests that sediment from streambanks may be a higher concern than construction site runoff.

Question & Answer Session:

- *Comment:* When accounting for disturbed area in the County, we need to also consider properties that are permitted and enforced by the state, such as schools, federal buildings and state buildings.
- *Large storms can blow-out sediment basins that have been designed for smaller storms. What can be done about it?* Unfortunately, it is not always reasonable to design for every storm event. Sediment and erosion control plans are typically designed around the smaller, more frequent storms that are likely to occur within the project time window. Large storms such as the event on June 14, 2006 are unfortunate events, but are typically rare and do not cause frequent problems for sedimentation and erosion control facilities.

Case Study #5 - Secondary & Cumulative Impacts

Since there was not sufficient time to present the case study on Secondary and Cumulative Impacts, this portion of the presentation will be postponed until the next meeting. If you would like any information regarding this topic, please refer to the Powerpoint presentation on the Task Force website.

Next Meeting

At the conclusion of the meeting, Tommy Esqueda of CDM asked everyone to return their questionnaires if complete. Those who wished to complete their questionnaires after the meeting were asked to fax (919-781-5730) or email (masond@cdm.com) completed copies to CDM as soon as possible.

The next meeting is scheduled for July 15, 2006 at 6:00pm at the Wake County Office Conference Room. Dinner will be provided at 5:30pm.

Consultant Action Items

As a part of a future meeting, CDM will address the following tasks:

- Review and compile results from task force questionnaire.