



TOWN OF CHAPEL HILL

Stormwater Capital Improvements Management and Financing Report

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I. Existing and Projected Conditions in Chapel Hill

This report examines the existing conditions and future challenges facing the capital facilities element of the Town of Chapel Hill's watershed management program. It looks specifically at environmental, political and economic, and regulatory concerns.

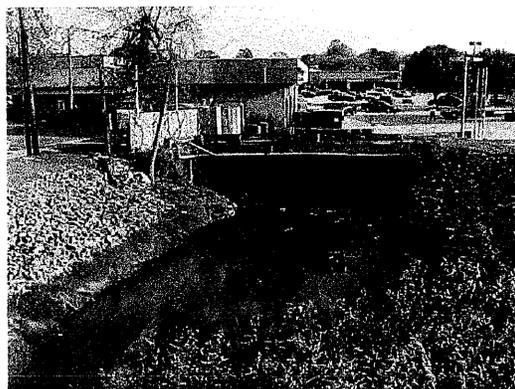
Environmental Context

Within its planning jurisdiction, Chapel Hill has five watersheds and seventeen subwatersheds. Unlike some other municipalities in North Carolina, Chapel Hill has a unique combination of steep slopes and clay soils, which means that some stormwater management solutions that work elsewhere in the state may not be effective here. The Town faces a series of particular problems associated with the health of its watersheds. These include threats to public safety and property caused by flooding during storm events, damage to property values, stream health and wildlife caused by sedimentation, and finally, concerns facing compliance with the Clean Water Act caused by increased nutrient and pollutant loadings into many of the community's streams.

Sedimentation:

As water flows throughout the town's stream system, it carries with it small particles, or sediment. As the water's velocity slows, these particles settle. Increased development activity, which causes soil erosion upstream, can contribute to high levels of sediment settling in lakes and ponds downstream. Chapel Hill has recently seen increased sedimentation problems including the persistent problem on Booker Creek due, in part to multiple construction projects upstream of Lake Ellen. Other problems caused by increased sedimentation include the destruction or impairment of beneficial wetland areas - such as the area adjacent to Eastwood Lake - which reduces the flood attenuation potential and water quality filtering effect of these areas.

Sedimentation is most likely to occur during the construction phase of new development, when land-clearing activity removes the vegetation that naturally holds soil particles in place. However, sedimentation can continue past the construction phase of a project, especially where the site is not properly re-vegetated, or has been improperly graded. Although the town has ordinances protecting against sedimentation from runoff during construction,¹ there are currently no ordinances protecting against post-construction sedimentation. Either maintaining or improving inadequate facilities that are incapable of handling present and future sediment loads may represent a significant



Outdated capital facilities such as the piping system under Eastgate Shopping Center (above) have led to increased problems in recent years.

¹ Chapel Hill Town Ordinances, Subpart B, Article V. Soil Erosion and Sedimentation Control.

portion of the Town's capital facilities burden.

Flooding

The recent flooding during storm events has been perhaps the most visible evidence of the problems in the Town's watershed health, and certainly the most damaging. Recent flooding on Piney Mountain Road and at Eastgate Shopping Center presented a major cost to both the Town and to the private sector. The infrastructure repair that was needed to respond to the flood damage, such as the reconstruction of Piney Mountain Road, places a significant burden on local business and on Town coffers. The July 26, 2000 flooding at Eastgate Shopping center alone produced an estimated \$8.3 million in damages.² Similarly, the loss of vegetation caused by structural encroachments into the Resource Conservation District (RCD) and OWASA utility easements, has reduced the flood absorption and water filtering potential of these buffers, thereby creating the potential for increased flooding, scour and pollution. Increased impervious surfaces due to new development also exacerbate existing problems. Chapel Hill's outdated floodplain maps and limited stormwater monitoring program make predicting and preventing these problems.³ And finally, limited financial and staff resources pose a significant obstacle to supporting these needed programs.

Pollutant and Nutrient Loading

Within the Town's watersheds, five major streams have been listed under North Carolina's administration of the federal Clean Water Act.⁴ (See Box 1). While Chapel Hill was not included in the implementation National Pollution Discharge Elimination System (NPDES) Phase I permitting program, the Town will be among those municipalities required to obtain an NPDES permit in Phase II of the programs implementation. Moreover, the state of North Carolina may in the near future require municipalities within the Cape Fear River Basin to meet stricter water quality standards than those presently required. Guaranteeing that the Town will have the resources to meet these demands is a major concern.

**BOX 1: TMDL LISTED STREAMS
IN CHAPEL HILL**

- Booker Creek
- Bolin Creek
- Little (confluence of Booker and Bolin)
- Meeting of the Waters
- Morgan Creek

Source 2000 Chapel Hill *Comprehensive Plan*

Political and Economic Context

The land area within Chapel Hill's jurisdiction is limited by the City of Durham and the Orange County rural buffer to the north, the Town of Carrboro to the west, and Jordan

² *Chapel Hill News*, July 30, 2000.

³ See Appendix A containing an approximate map of Chapel Hill's floodplains and indication where major recent flooding events have occurred.

⁴ In 1972, the federal Clean Water Act prohibited the discharge of pollutants into the waters of the United States. The Act was revised and expanded in 1990 to include pollution, or discharge, from more diffuse sources, or "non-point" sources, such as stormwater run-off. Under the CWA, states are charged with designating certain streams which fall below a designated level of pollution as impaired, and are required to establish a total maximum daily load (TMDL) which effectively caps the amount of certain pollutants and nutrients which can be discharged into the waterway.

Lake to the east. Much of the town's land area has already been developed, and it is predicted that Chapel Hill's remaining undeveloped land (which constitutes only 10% of its jurisdiction) will be built out by 2025.⁵ This relatively low percentage of developable land will be the target of most new storm water management policies. However, some programs and policies designed to mitigate problems within the town's developed areas - such as map updates and retrofitting - will be needed as well. Therefore, the burden to finance an expanded storm water management program will have to fall on the entire area of the town.

Chapel Hill currently independently manages the stormwater flowing through its jurisdiction. Both Bolin and Morgan Creeks begin in the Carrboro planning jurisdiction, but at present Chapel Hill has no joint management agreement with either Carrboro or Orange County. After stormwater leaves the planning jurisdiction of the Town, it flows into nearby Jordan Lake. At present, Chapel Hill works with adjacent jurisdictions in some areas of storm water management such as erosion control permitting and enforcement and water quality issues such as sampling. More cooperation with other jurisdictions would be required for a watershed-wide approach. If the jurisdictions decided that a joint storm water management program is desirable, there are several ways that Chapel Hill and others could implement the program including collective water quality goals or by ceding authority to a regional organization such as OWASA.⁶

Regulatory Context

The most important regulations that affect stormwater capital facilities in Chapel Hill are the new NPDES Phase II regulations and the guidelines established by the Chapel Hill *Comprehensive Plan*.

NPDES Phase II Requirements⁷

Under Phase II, MS4 municipalities within "urbanized areas" must have an NPDES permit issued to them by March, 2003.⁸ Based on the 1990 Census and the Census Bureau definition of MS4 municipalities, Chapel Hill automatically fits this requirement.⁹ To be issued a permit each

Box 2: NPDES Phase II Permit Requirements

- Public Education and Outreach
- Public Participation/Involvement
- Illicit Discharge Detection and Elimination
- Construction Site Runoff Control
- Post-Construction Runoff Control
- Pollution Prevention/ Good Housekeeping

Source: EPA, *Storm Water Phase II Fact Sheet Series*, # 2.0

⁵ Chapel Hill *Data Book 2000*.

⁶ Under N.C.G.S. § 162A OWASA has the authority to administer either a multi-jurisdictional or single jurisdiction stormwater utility involving Chapel Hill.

⁷ The final Phase II rules can be found at 40 CFR parts 9, 122, 123 & 124.

⁸ MS4 municipalities include "regulated small" municipalities with "separate storm sewer systems. For a definition of "municipal separate storm sewer system" see 40 CFR 122.26(b)(8). See also, Environmental Protection Agency. *Storm Water Phase II Final Rule, "Who's Covered? Designation and Waivers of Regulated Small MS4s,"* Fact Sheet 2.1. January 2000. Available at <http://www.epa.gov/owm/sw/phase2/factshts.htm>.

⁹ Appendix 6 of Preamble to NPDES— "Governmental Entities Located Fully or Partially Within an Urbanized Area." Available at <http://www.epa.gov/owm/sw/phase2/final.htm>. Some local governments may also apply for a waiver for Phase II requirements. Chapel Hill, however, does not meet any of the required criteria to be eligible to apply for a waiver. "Who's Covered ?... ," Fact Sheet 2.1.

municipality must have filed a permit application including a Notice of Intent that outlines the municipality's implementation strategy as well as measurable goals for each of the six program elements listed under the Phase II rules.¹⁰ The six requirements are listed in Box 2. Chapel Hill has already met some of these requirements, such as construction site runoff control.¹¹ The Town has historically done elementary education programs and other outreach programs, such as the Big Sweep, as a part of an on-going education and public participation program. Additionally, developers are being asked to utilize best management practices such as bio-retention and grassed swales as a part of the permit review process in Town. This trend is the result of the anticipated NPDES Phase II permit requirements. Though significant, it is currently unclear as to whether these efforts will be sufficient to meet the NPDES Phase II requirements. It is also unclear as to whether additional funding will be needed to maintain the programs in the future. At the very least, new development ordinance language will have to be written and adopted that officially incorporates existing programs into the Town's overall storm water management program.

Comprehensive Plan Requirements

Another important regulatory concern for the Town is the recently adopted 2000 *Comprehensive Plan*. Though not mandatory in the same sense as NPDES permitting requirements, Chapel Hill has traditionally taken comprehensive planning seriously and has had several major, recent projects guided by the Town's stated comprehensive planning goals. There is no reason for stormwater management to be any different. Box 3 states the relevant actions and measures of progress mandated by the 2000 *Comprehensive Plan*. In terms of stormwater capital facilities, the most relevant action and measure of progress are the requirements to adopt a dedicated source of funding for the program by 2004.

Box 3: Actions for Stormwater Management

- Evaluate the application of low impact development to Chapel Hill
- Adopt and implement improved erosion and sedimentation requirements
- Develop a utility/dedicated sources of funding for stormwater management

Measures of Progress for Stormwater Management

- Complete an evaluation of the application of low impact development to Chapel Hill no later than 12/31/2004
- Adopt a dedicated source of funding for stormwater management no later than 12/31/2004

Source: 2000 Chapel Hill *Comprehensive Plan*, p. 87.

¹⁰ Environmental Protection Agency. *Storm Water Phase II Final Rule*, "Permitting and Reporting: The Process and Requirements" Fact Sheet 2.9 and "Small MS4 Storm Water Program Overview," Fact Sheet 2.0. January 2000. Available at <http://www.epa.gov/owm/sw/phase2/factshts.htm>. Note that while permits will be issued by December 9, 2002, municipalities may file their applications as late as March 10, 2003. "Permitting and Reporting..." Fact Sheet 2.9.

¹¹ North Carolina has established some during-construction sedimentation controls; similarly, the Town has established additional during-construction runoff control rules as well fines for noncompliance. See, N.C.G.S. § 113A-50 – 113A-67; Chapel Hill Code of Ordinances, Subpart B, Chapter V, Art. V "Soil Erosion and Sedimentation Control." The Town also requires construction projects to follow the Orange County *Soil Erosion and Sediment Control Manual*. CH Code of Ordinances Subpart B, Chapter V, Sec. 5-86(2).

II. The Town's Existing Stormwater Management Program

The Town of Chapel Hill has taken several important first steps to correct its water quality problems and to manage its stormwater. These include the formation of the Resource Conservation District (RCD), a Watershed Protection District covering the southern half of town, the establishment of a series of water quality monitoring stations, and the Town's Drainage Assistance Fund.

Regulatory Districts

Both the RCD and the Watershed protection District were enacted to help maintain water quality within the Chapel Hill planning area. The RCD sets a fixed width buffer of seventy-five or one hundred feet from any listed perennial stream within the Town's planning jurisdiction. Within this buffer, development has been somewhat curtailed and significant amounts of existing vegetation in this district has been preserved. Problems such as flooding and pollutant loading occur more often in areas where existing development supercedes the RCD regulations. These are the areas where mitigation activities such as retrofits would be expected to occur. Similarly, the Watershed Protection District places several requirements upon new development including maximum impervious surface standards and water quality treatment in wet ponds.

Monitoring System

The monitoring system has thirteen monitoring stations located throughout town and has been recording data almost continuously since 1993. (See Box 4) The system records data for a variety of parameters including pH, fecal coliform, turbidity, nutrients, dissolved oxygen and others. Starting this year, the existing data from the stations has been compiled into a database.¹² To date, however, this monitoring data has not been incorporated into a broader, systematic stormwater management and capital improvements and program.

Box 4: Chapel Hill Water Quality Monitoring Sites

- 4 on Morgan Creek
- 3 on Bolin Creek
- 3 on Booker Creek
- 3 others in tributaries

Drainage Assistance Fund

At present, Chapel Hill implements stormwater capital improvements on an ad hoc basis using money from the Town's General Fund. The Town currently spends about \$30,000 - \$50,000 on its "Drainage Assistance Fund," which in turn funds stormwater capital improvements on an as-needed basis.¹³ While the program has been effective in the past, the program today is reactive in that it responds to problems as they arise rather than anticipate and prevent future problems.¹⁴

¹² Royal, Fred. "Chapel Hill Water Monitoring Program," given as a PowerPoint presentation. 2001.

¹³ Phone conversation with Mike Neil, Town of Chapel Hill Engineering Staff, on February 1, 2001.

¹⁴ Email message from Fred Royal, Town of Chapel Hill Stormwater Engineer, February 13, 2001.

To continue to be effective for the next twenty to thirty years, Chapel Hill must implement a more comprehensive stormwater management and capital investment system. Such a program would allow the town to deal with increasingly serious environmental concerns as well as to comply with new regulatory mandates.

III. Capital Improvement Options

Any capital improvement program has two main elements: financing and implementation. Depending on municipality size, sophistication of resources and local goals, municipalities have developed a variety of ways to carry out both elements. Often municipalities will combine several options to meet both their financing and implementation objectives

The following material utilizes case studies to compare the most popular funding methods including the general fund, the utility, and impact fee. These studies also analyze how other municipalities have integrated their funding programs and implementation tools to meet local goals.

The case studies are of Cary; Charlotte; Columbus, Ohio; Durham; Greensboro and Raleigh.¹⁵

Not surprisingly, the programs with the lowest costs per residence for stormwater management tended to have the least comprehensive programs. Chapel Hill, Cary and Raleigh all use annual appropriations from a general fund to meet their stormwater capital improvements needs. While it appears that each of these municipalities will be able to meet NPDES Phase II requirements, it is unclear how well the ad hoc funding strategy will allow the cities to expand and enhance their capital improvements systems in the long run. Moreover, ad hoc funding sources alone have been insufficient to provide any of the cities the capacity to do comprehensive water quality monitoring or to tie capital improvements to water quality data.

In contrast and again as would be expected, the cities that required more per residence tended to have much more comprehensive stormwater management programs. Charlotte, Greensboro and Durham in particular rely heavily on a stormwater utility that assesses a regular fee to residences. In addition to being able to meet NPDES Phase I and III requirements, both cities have tied the capital facilities plan to water quality monitoring data. And Charlotte recently became the first city in the nation to remap its floodplains based on projected total buildout.

Box 5: Capital Improvements Options

Financing Options

- General Fund/Property Taxes
- Stormwater Utility (dedicated funding source)
- Impact Fee(s)
- Impact Tax(es), "Head Taxes"
- Bond Issues
- Special Assessment Tax Districts.

Some Implementation Tools

- Ad Hoc/Reactive
- Capital Improvements Schedule
- Water Quality Monitoring
- Fiscal Impact Analysis
- Best Management Practice (BMP) Programs
- Adequate Public Facilities Ordinance

¹⁵ The only five North Carolina municipalities required to meet NPDES Phase I requirements were Charlotte, Durham, Greensboro, Raleigh and Winston-Salem.

**Figure 1: Comparison of Stormwater Capital Facilities
Financing and Implementation Options¹⁶**

JURISDICTION	Financing Measure	Cost per Residence (per year)	Implementation Measures	Tied In to Other Measures?
Chapel Hill	General Fund (Property Taxes)	\$2.25 - \$3.75 ¹⁷	Ad hoc, limited monitoring, cap. improve. schedule	Nominally tied to comp. plan, currently not tied to monitoring
Cary	General Fund	\$6.00 - \$7.10 ¹⁸	Cap. improve. schedule, burden is on new dev. to finance projects	Cap. improve schedule, driven by NPDES compliance
Charlotte	Mainly utility, A little from general fund	\$47.64 - \$60.72	Extensive monitoring, cap. improve. schedule	Tied to monitoring and cap. improve. schedule, meets NPDES reqs.
Greensboro	Utility, some permitting fees	\$29.28	Extensive monitoring, cap. improve. schedule.	Tied to monitoring system and cap. improve projects schedule and comp. plan
Raleigh	General Fund, other fees	\$2.65 or less ¹⁹	Cap. improve. schedule,	Cap. improve. schedule, driven by NPDES compliance
Durham	Utility, some general fund	Collected: \$51.22-\$71.22 Spent: \$26.83-\$37.29 ²⁰	Extensive monitoring, cap. improve. schedule,	Tied to monitoring, cap. improve. schedule and comp. plan, designed to meet NPDES; 10% reserve
Columbus, Ohio	APFO	Not applicable	Adopted comp. plan and then APFO to meet plan reqs.	Tied to comp. plan and Town's ability to provide new services

¹⁶ For cities of Raleigh, Cary and Chapel Hill the dollar figures were calculated by taking the annual amount spent on stormwater capital improvements and then dividing it by the number of households in the community. The number of households in a community was determined by taking the town population and then dividing it by three, which was used as an estimate for the number of people per household. This process made the dollar amounts easier to compare with the dollar amounts for Charlotte and Greensboro, both of which levy fees on a per household or per property basis.

¹⁷ This figures assumes that Chapel Hill has a population of 40,000 (about 13,340 homes).

¹⁸ This figure assumes an annual budget of \$190,000 to \$225,000 for stormwater capital improvements. The figure also assumes a population of about 95,000 (about 31667 homes). Source: interview with Terry Warren, Town of Cary Stormwater Manager and Betsy Pierce, Town of Cary Stormwater Specialist, April 3, 2001.

¹⁹ This figure assumes a population of 280,000 people (about 93,333 homes) within Raleigh's corporate limits. The number also does not reflect tax contributions made by businesses. The additional 100,000 people within Raleigh's ETJ are served by Wake County. Source: interview with Mark Senior, City of Raleigh Stormwater Division Engineering Staff, April 3, 2001.

²⁰ The stormwater utility generates an estimated \$4.2 million in revenue annually. Of that, roughly \$2.2 million is allocated for capital projects: \$1.2 million for maintenance and repairs, and an additional \$0.7 - \$1.0 million for capital improvements, primarily to fund the city's Drainage Assistance Fund. Another 10% is kept in reserves. The population within Durham's city limits is roughly 177,650 (between 59,000 and 82,000 households). The above dollar amount assumed annual expenditures of \$2.2 million. Source: City of Durham 2000 Data Book and interview with Doug Vaughn, Manager, Stormwater Services Division, Durham Department of Public Works

IV. Analysis of Case Studies

Based on our case study research, there are several important conclusions to be drawn about implementing stormwater capital facilities programs:

- 1) Few if any effective programs relied on one source funding. Often municipalities combined a dedicated source of funding, such as a utility, with an ad hoc source such as an assistance program funded by the general fund.
- 2) Though not specifically required by NPDES, the only truly dedicated source of funding for meeting capital improvements goals was a stormwater utility.
- 3) The most comprehensive programs all have a clear mandate from a comprehensive plan and a capital improvements schedule derived from accurate and comprehensive information (i.e. accurate maps and monitoring information).
- 4) Effectively, implemented programs go hand in hand with other effective growth management tools, such as riparian buffer requirements and impervious surface limits.
- 5) At present the average citizen of Chapel Hill pays significantly less than citizens in other North Carolina communities for stormwater management.

V. Financing a Stormwater Capital Improvements Program

There are a variety of ways to finance a stormwater management program. These methods include a general fund, a stormwater utility, impact fees, impact taxes, "head taxes," bond issues and special assessment tax districts. Below is a discussion of various options.

Ad Hoc Financing

Traditionally, the general fund has been one of the most common funding sources for financing capital improvements. This method has been dubbed "ad hoc" not because of a sporadic nature but because the money must be appropriated each year. In our case study analyses, Raleigh and Cary were the only two municipalities to use strictly a general fund method of financing stormwater

Box 6: Raleigh Ad Hoc Financing, Meeting NPDES Phase I

Currently there is no utility in Raleigh, and the City has no plans for one in the future.

The stormwater capital improvements program focuses 1/3 of its resources on water quality and NPDES compliance and 2/3 on infrastructure investments.

All money spent on stormwater capital facilities comes from the General Fund and is spread out through several city departments. The City's Stormwater Division is a designated line in the General Fund with a total annual budget of about \$1.5 million (inclusive of salaries, etc.). The City also has a Drainage Assistance Fund, which does retrofitting work on private property; annual the budget is \$250,000.

Stormwater capital improvements are part of the city's larger Capital Improvements Plan, which has an annual budget of \$500,000 for repairs and maintenance and \$1.5 million for new projects and upgrades.

Raleigh and Wake County will be producing a Comprehensive Watershed Management Plan by June 2002.

**Total cost per residence
per year: \$2.65**

*Source: Mark Senior, City of Raleigh
Stormwater Division Engineering Staff*

capital facilities. (See Boxes 6 and 7)

The ad hoc method has two important advantages. The first is political. Because the money comes from existing funding sources – primarily property taxes and fees, there is seldom citizen opposition to spending funds on capital improvements, including stormwater system improvements. In contrast, implementing funding sources such as utilities or impact fees are almost always politically contentious issues that require support from both Town staff and elected officials to get passed. Also, money taken from a general fund generally has fewer restrictions on how it must be spent than money taken from other sources. Money received from utilities, for example, must be spent on the designated purpose of the utility. Money garnered from impact fees and impact taxes require an even closer fit: they must more or less be spent to the specific benefit of those who paid the fee or tax.

The biggest drawback to ad hoc financing is that it is not a dedicated funding source. That means that stormwater funding becomes subject to economic cycles in ways that other funding options do not. Though not likely, if property values within the Town were to drop for a sustained period, then funding for stormwater management would drop accordingly, even though unfounded regulatory mandates would still be in effect. As noted before, the Chapel Hill's 2000 *Comprehensive Plan* mandates a dedicated funding source for stormwater management.

Overall, the ad hoc method seems to work best in jurisdictions that prefer to finance capital improvements needs as they arise (either through yearly review or through citizen requests). In the case of smaller municipalities with limited resources, this method may be the only feasible option. The other major use of ad hoc funding is to supplement other funding methods such as a utility or impact fees.

Stormwater Utility

First enacted by Greensboro to help it meet NPDES Phase I requirements, stormwater utilities have become increasingly popular among large North Carolina municipalities as a way to finance their stormwater

Box 7: Cary Ad Hoc Financing, a Water Quality Emphasis and Greenways

There is no utility in Cary, but the Town has yet to rule it out.

Before this year, the Town has spent on average \$150,000 to \$200,000 on stormwater capital improvements. The FY2002 budget marks the first year that the Town Engineering Department has requested a specific line in the budget for the Town Stormwater Program. The Program has requested \$350,000, of which 40%-50% will go toward stormwater capital improvements. There is also about \$50,000 available for storm grate repairs.

Though the Town has a CIP, the traditional approach has been "fire stopping" or addressing hot spot problems as they arise. The Town does not have a fund for subsidizing improvements on private property. In rare cases, the Town may finance improvements on private property. Because most private facilities are new and have been installed by developers, repairs in the private stormwater network are rare.

The Town includes acquisition of greenways lands in its NPDES compliance literature.

**Total cost per residence
per year: \$6.00 – \$7.10**

Sources: Betsy Pierce, Town of Cary Stormwater Specialist. Terry Warren, Town of Cary Stormwater Manager.

management programs. Of the cities we studied, Charlotte, Greensboro and Durham have stormwater utilities. (See Boxes 8, 9 and 10) Advocates of utilities say that the need for comprehensive stormwater services demands that a utility be viewed in the same light as other utility services such as electricity and water. Because everyone "utilizes" a jurisdiction's stormwater system, advocates argue that everyone should be required to pay a proportional share of the costs.

Stormwater utilities have five major benefits. The first is that they are a dedicated source of funding. Stormwater utilities are most often calculated based on the amount of impervious surfaces a property has. Therefore, so long as there are impervious surfaces within a jurisdiction, there will be funds from a utility. Secondly, because the utilities are usually based on square footage of impervious surfaces, they more accurately reflect amounts of individual use of the system (like paying for kilowatt hours). Also, utility pricing can be geared toward achieving other water quality goals. Following the example of Charlotte, a utility fee could be structured so that citizens who have implemented structural and non-structural BMPs would pay a lower fee. The third benefit is that in the case of Chapel Hill, implementing a utility could make the creation of a joint stormwater management program with Orange County and Carrboro easier. The reason being that a standardized utility fee would make administering a multi-jurisdictional stormwater program through an agency such as OWASA much easier.

The fourth major benefit is that a utility is not a tax. Unlike impact taxes, which must be used for projects directly affecting those who paid the tax, a stormwater utility is just that – a utility based on use. Utility fees may be charged to all property owners including

Box 8: Charlotte A Stormwater Utility; From Worst to First

Begun in 1993, Charlotte's utility was enacted in response to a poorly maintained stormwater system that had been neglected for decades.

Charlotte-Mecklenburg has recently completed an independent county-wide floodplain mapping project. Charlotte is the first city in the country to base its floodplain maps on final build out, thereby allowing government officials to more accurately estimate the future impacts of new development. All future stormwater infrastructure will be based on ultimate build out flood volume.

Also, the City is currently developing a real-time flood monitoring system. When completed an automated phone system will dial nearby landowners and warn them when a creek is about to flood.

The basic stormwater utility rate is as follows:

Attached to city water system, in the city limits

Less than 2000 sq. ft. = \$3.97 per month
Greater than 2000 sq. ft. = \$5.06 per month

Not attached to city water but within the city limits

Less than 2000sq. ft. = \$23.82 once every six months
Greater than 2000 sq. ft. = \$30.36 once every six months

Implementing BMPs may allow a utility payer to reduce the utility fee by up to 100%.

**Total cost per residence
per year: \$47.64 – \$60.72**

Sources: Nancy Carter, District 5 Representative, Charlotte City Council member. Sara Spencer, District 1 Representative, Charlotte City Council member. Charlotte.Com Website at <http://www.charlotte.com>

tax-exempt organizations such as churches. The final benefit to a utility is that it does not require special authorization from the General Assembly, as do impact fees.²¹

There are, of course, drawbacks to stormwater utilities as well. By themselves, utilities are often inadequate to finance large periodic projects, such as floodplain remapping. In these cases, the local government must supplement the utility funds with money from the general fund. Also, it should be noted that no municipality in North Carolina currently finances its entire stormwater management program through a utility.²² A more serious concern, however, is that stormwater utilities are often a politically contentious issue and can be very difficult to implement. Opponents of implementing stormwater utilities often call them a “rain tax,” implying that the utility unfairly charges people for natural occurrences. Even though Chapel Hill residents currently pay far less per capita for stormwater management than other large North Carolina municipalities (see Figure 1 above), it may be hard to sell town residents on yet another fee when land rents are already among the highest in the state. In implementing their utilities, Charlotte, Greensboro and Durham tried to reduce political difficulties by involving stakeholders throughout the process of creating their utilities.

Other Funding Options

Because they are the most common methods, this report has focused primarily on the ad hoc and utility financing options. Other possible options include and impact fees, an impact tax, a head tax, bond issues and special assessment tax districts.

Box 9: Greensboro North Carolina's First Stormwater Utility

Greensboro was the first city in North Carolina to adopt a stormwater utility.

The City had three criteria that it used to select a utility over other funding methods. They included:

- 1) equity among city residents,**
- 2) A stable and continuous funding source as required under NPDES Phase II requirements and**
- 3) Ease of administration.**

The City charges a flat fee of \$2.44 per month to each single-family residence in town. For other properties, including commercial and multifamily, the property owner is assessed a monthly fee based on the number of Equivalent Residence Units (ERUs) of impervious surface the site has. Through a statistical sampling, the City found that the average residential lot has about 2,543 square feet of impervious surface. This number equals 1 ERU. Therefore, non single family site with 5,000 square feet of impervious surfaces would have about 2 ERUs and would pay about \$5.00 per month

Today, the city has combined the program with a comprehensive water quality monitoring system and a capital improvements schedule. The City Stormwater Division refers to management process as a “holistic” approach to management.

**Total cost per residence
per year: \$29.28**

Source: City of Greensboro website at
<http://www.ci.greensboro.nc.us/stormwater>

²¹ Though the issue has not been litigated in North Carolina, it is likely that a court would apply the “arbitrary and capricious” standard to the issue of whether stormwater utilities are within the general powers of a local government.

²² *Stormwater Utility Technical Committee Report* for the Town of Chapel Hill. January, 1999.

An **impact fee** for stormwater management is a uniform fee on new development to help finance the cost of new stormwater management systems as well to help maintain older systems. In areas where there is a large amount of developable land available as well as a high residential growth rate, an impact fee may be a feasible way of financing part of a stormwater capital improvements program. An impact fee would do little for Chapel Hill because the Town has nearly reached build out and because it would be difficult for the Town to annex new land. If, however, the Town decides to implement a stormwater impact fee, it does have the legislative authorization from the General Assembly to act.²³

An **impact tax** is similar to an impact fee except that the cost to the developer varies according to the value of the new development rather than the impact on capital facilities. Impact taxes suffer from the same problems as an impact fee. Also both the fee and the tax require that funds received be more or less for the direct benefit of those who have paid them. Neither the ad hoc or utility methods require such close fitting.

A **head tax** is simply a flat fee paid by each person with a jurisdiction. The method has not been tried and may have Constitutional problems. It does, however, have the benefit of being a dedicated funding source that it is easy to collect.

Bond issues are a popular way to finance other capital improvements such as schools and roads. A bond could also be issued for stormwater management or for a comprehensive capital improvements package, which includes stormwater management. In 1996, the Town in fact did pass a \$400,000 drainage bond for capital projects. The bond money, however, had to be utilized unexpectedly for the recent Piney Mountain road repairs. To date, no other jurisdiction within the Triangle has attempted such a move.²⁴

Special assessment tax districts, as the name implies, are areas where a special fee or tax is levied to finance specific projects. This method has been used in Chapel Hill for the downtown area to finance projects there. Utilizing this method for storm water

Box 10: Durham “Utilizing” High Flood Levels

Durham recently enacted a stormwater utility in large part because it found flood levels around the city to be much higher than the existing maps predicted. The Planning staff found that in some areas around town the actual flood level was *ten feet higher* than what the outdated FEMA flood maps predicted. The City has combined the utility with new, tougher riparian buffer standards that include buffering of intermittent streams.

The stormwater utility generates an estimated \$4.2 million in revenue annually. Of that, roughly \$2.2 million is allocated for capital projects: \$1.2 million for maintenance and repairs, and an additional \$0.7 - \$1.0 million for capital improvements, primarily to fund the city's Drainage Assistance Fund. Another 10% is kept in reserves.

**Total cost per residence
per year:
Collected: \$51.22-\$71.22
Spent: \$26.83-\$37.29**

Sources: Doug Vaughn, Manager of the Stormwater Division of Durham Department of Public Works; Durham's Online Data Book: http://www.ci.durham.nc.us/departments/eed/2000_databook.pdf.

²³ CH Code of Ordinances, Subpart A, Art. 7, Sec. 5.34.

²⁴ Triangle J Council of Governments. *Growth Management Survey*, 1999.

projects has not been tried in North Carolina, however, and may have Constitutional problems when applied specifically to stormwater management.

VI. Implementing A Stormwater Capital Improvements Program

Unlike financing, an effective stormwater capital improvements program has certain elements that should be in place. These elements include a comprehensive planning, a capital improvements schedule, water quality monitoring, fiscal impact analysis and BMP programs (structural and nonstructural).

Below is a discussion of how these elements integrate into a complete stormwater management program. This section also includes a brief discussion on adequate public facilities ordinances as an alternative way to implement stormwater capital improvements programs.

Comprehensive Plan

In order to give a focus to the program, clear direction from the comprehensive planning document of a municipality is almost essential. This is perhaps the best way the community can lay out its goals for its watershed health, and establish priorities for capital facilities spending based on the community's values.

The 2000 Chapel Hill *Comprehensive Plan* mandates that the town adopt a utility or at the very least a dedicated source of stormwater funding. Rightly so, the Plan assumes that a dedicated source of funding is essential to fulfilling the other environmental quality and watershed health goals contained within the Plan.

Monitoring

In meeting the goal of water quality improvement or protection, a municipality must monitor its streams and drainage infrastructure. Test sites throughout the jurisdiction must be carried out on an on-going basis to monitor stream water quality as well as drainage problem areas. The Town has established a limited monitoring system to collect data on the various nutrients and pollutants, as well as gauge turbidity, temperature, and other factors affecting watershed health. Using this data, the Town has established a stream quality database, but has not effectively used the information for implementation actions. Also, the State Division of Water Quality has recently received a grant to assess the Little Creek watershed (Booker and Bolin Creeks and tributaries) over a two-year

Box 11: Columbus Ohio A Stormwater Adequate Public Facilities Ordinance

The only example of a stormwater APFO we could find, Columbus enacted its ordinance as part of a larger APFO where all of the city's capital improvements are subject to APFO requirements.

The current standards require the storm sewers be capable of carrying the two-year, 24-hour storm event within the pipe and a five-year, 24-hour storm event within the entire system. New development must either restrict runoff for the two-year storm event to a runoff coefficient of 0.4, or it must limit the peak flow of the runoff to the ability of the downstream stormwater system to convey the flow. Plus, all new storm systems must be built so that not structure will be "directly impacted" by a 100-year, 24-hour storm event.

Source: DeRodes, Deneem M., Beth Clark & Stephen R. McClary. "Columbus Adequate Public Facilities Ordinance: A New Use for an Established Technique," Conference paper given at the American Planning Association *Contrasts & Transitions* Conference, 1997. Available online at <http://www.asu.edu/caed/proceedings97/derodes.html>.

period to determine the types and sources of pollutants in the streams. The information will lead to recommendations for corrective implementation actions.

Overall, more monitoring will make it easier to tie capital improvements to impervious surface standards and riparian buffer standards. It will also allow the city to more accurately gauge the effectiveness of structural BMPs and NPDES compliance strategies that have been implemented.

Fiscal Impact Analysis

This type of analysis forecasts what expenses will be for new services and facilities as well as for maintenance of existing services and facilities. The largest benefits to doing this type of analysis are the predicative ability and because it lets a jurisdiction choosing the financing option best suited to its needs. Most jurisdictions in North Carolina do not do any formalized type of fiscal impact analysis, though that trend may soon be changing. Techniques range from the fairly simple method of simply multiplying cost by residents in a community to more complex marginal cost modeling.²⁵

CIP budget and priorities list

In addition to providing direction for the overall watershed program through a comprehensive plan, a municipality should establish a set of funding priorities, or Capital Improvements Plan. These documents are often developed for transportation, water & sewer, and educational facilities. Stormwater management capital improvements could be included as an additional item in the community's existing Capital Improvements Plan, or an independent funding plan should be established for stormwater facilities.

Currently, Chapel Hill has no funding priorities plan for stormwater facilities. Its expenditures are made on an as-needed basis, which has proven to be both inefficient and inadequate at addressing the overall problems with the community's watershed facilities system.

Accurate floodplain maps and Facilities System mapping

An absolutely critical element of a stormwater management and comprehensive watershed health system is accurate information. The location and extent of flood prone areas is often determined by mapping provided by the Federal Emergency Management Agency (FEMA). Too often, these maps are out of date, do not include all roads, do not include topographic or soils information, and do not reflect the current flood levels, which often rise due to increased development activity and improved modeling techniques. In addition, many communities do not have a comprehensive map of their stormwater facilities system. Therefore, it is impossible to estimate the capacity of certain areas to accommodate storm events, and difficult if not impossible to predict where problem spots will arise.

Charlotte has just finished making its own floodplain maps based on total build out. The City of Durham found in re-mapping its flood plains, that flood levels differed from

²⁵ Management Information Service (MIS) Report. *Analyzing the Fiscal Impact of Development*, vol. 20, n. 7. July, 1988.

FEMA maps in some areas by as much as ten feet. Raleigh is in the process of completing a comprehensive survey of its existing stormwater facilities system, both publicly and privately owned. This will allow the City to determine it's system's capacity and enable it to anticipate trouble spots before problems arise.

Chapel Hill is currently using FEMA maps that are inaccurate and out-dated. The Town has a map of its stormwater system, but it is by no means comprehensive.

APFO

An adequate public facilities ordinance is by far not a required element in an effective stormwater capital improvements program. Some communities, however, have found that by establishing concrete guidelines the process of approving or rejecting new development becomes much easier and less arbitrary.

VII. Recommendations

Based on the forgoing analysis, it is recommended that Chapel Hill should, at the very minimum, seek to implement the following:

Dedicated Funding Source

The Town should adopt a dedicated source of funding to finance its stormwater capital improvements program. A dedicated source is preferable because the required improvements to the current stormwater capital facilities and the continued maintenance of the system are simply too great to be adequately covered by an ad hoc system. Furthermore, unlike many other North Carolina municipalities, Chapel Hill cannot rely solely on fees paid from new development to cover the cost of stormwater management for the entire town. Similarly, any sort of development-related exactions will not be sufficient to meet the needs of the town.

Based on the experience of other municipalities and the research conducted by the Chapel Hill Stormwater Utility Technical Committee, it appears that a stormwater utility combined with at least some continued ad hoc funding would best serve this end. The stormwater utility method has the benefit of charging evenly both current and future residents of the Town as well as being based on objective, rationally related criteria. Moreover, the since the stormwater fee is not a tax, revenues may be more equitably spread over the entire community, including nonprofit organizations which impact the town's watershed health. In addition, the funds collected through the utility need not be used directly for those who paid it (as in the case of exactions), and thus the town may have the maximum degree of flexibility in expending the funds as needed, according to a capital improvements plan.

Implementing a utility, however, has the potential to be a politically contentious issue. Chapel Hill must engage in a significant amount of public education and include participation by a wide range of stakeholder groups in order to assure that a utility is implemented. On the other hand, supplemental allocations from the general fund remains important as a safeguard for large or unexpected projects.

Current Needs Assessment

Whether or not the Town implements a stormwater utility, Chapel Hill must assess its existing system's capacity, as well as the total costs of expanding the capital improvements system and monitoring program to meet both Town goals and NPDES Phase II requirements. Likewise, the town will have to assess how much of these costs realistically should or could be covered by annual appropriations to the Town Drainage Assistance Fund and how much should be covered by a dedicated funding source. After setting a target funding figure, the Town will then have to study the best way to allocate the increased costs to residents. As noted above, Greensboro provides an excellent model for this task, as they had to assess the average amount of impervious surface per home before they could begin their utility.

Box 12: Summary of Recommendations for Chapel Hill's Stormwater Management Program

- *Dedicated Funding Source.* The Town should implement a dedicated funding source to finance its program. Based on the experience of other municipalities, the most efficient and effective approach is for the Town to create a stormwater utility.
- *Current Needs Assessment.* Chapel Hill must undertake a comprehensive needs assessment and system analysis to determine current capacity and future needs.
- *Investment in Information.* The Town must base its capital expenditures on accurate information, including detailed mapping, monitoring, and facilities inventory.
- *Integration of Regulations.* The Town must integrate its capital facilities spending with other preventive measures in order to minimize cost and maximize its infrastructure investment.
- *Inter-jurisdictional Cooperation.* Watershed management does not fit neatly into municipal boundaries. The Town should actively seek to partner with neighboring jurisdictions in its approach to stormwater management.

Investment in Information

One of the Town's first investments should be in information. By ensuring that capital expenditures are based on accurate information, including updated and detailed flood and system facilities mapping, the Town will be able to minimize costs and increase the efficiency of its capital spending.

Integration of Regulations

Money alone will not solve the Town's stormwater management challenges. The Town must also integrate its current stormwater capital facilities system with objective measures based on accurate maps and more comprehensive water quality monitoring. As discussed in the companion to this paper on impervious surfaces, the Town should also integrate regulatory methods as a means to reduce stormwater runoff, and thus the need for expenditures on capital facilities.

By encouraging or requiring both new development and existing town businesses and residents to implement best management practices to detain and treat stormwater runoff on site, the Town could effectively reduce the overall need for maintenance to the downstream drainage system. By allowing residents to use BMPs to offset any fees charged them (i.e. utility fees or impact fees),

the Town could also generate an incentive for citizens to reduce total runoff from their properties.

Inter-jurisdictional Cooperation

Finally, Chapel Hill's official policies should recognize the fact that watershed management does not fall within a single jurisdiction's boundaries. A cooperative, multi-jurisdictional approach to stormwater management would be the most effective means to meet the Town's own stormwater goals and objectives of its *Comprehensive Plan*. To the extent that Chapel Hill establishes effective partnerships with other jurisdictions, its overall program will be enhanced. It is presently feasible for Chapel Hill to initiate a joint financing and stormwater management program with neighboring and inclusive jurisdiction such as Carrboro, UNC-Chapel Hill and Orange County. The current Stormwater Utility and Development and Implementation Study Committee is reviewing these issues to achieve regional consensus and cooperation. The Committee is expected to make recommendations in September, 2001.



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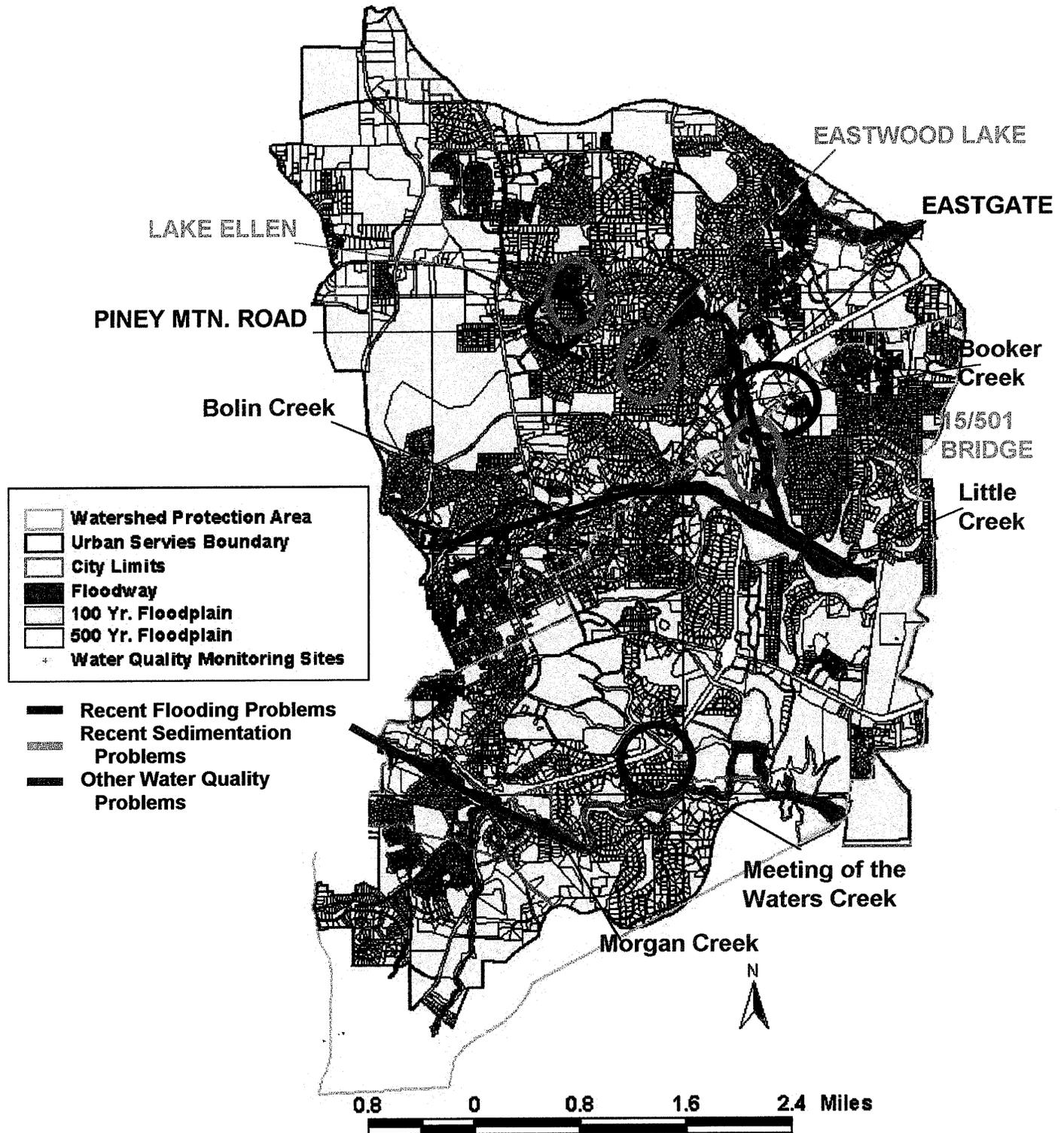
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Appendix A

Town of Chapel Hill Generalized Floodplain Map*



*This map is not based on FEMA Floodplain Maps or field surveys and is therefore strictly an approximation of Chapel Hill floodplain areas.

Appendix B

		North Carolina Communities That Have a Stormwater Utility*				
		Charlotte/Mecklenburg County	Fayetteville	Greensboro	Wilmington	Durham
Stormwater Program Elements	Stormwater Program Planning	Funded By Utility	Not Funded	Funded By Utility	Funded By Utility	Funded By Utility
	Floodplain Management (Nat. Flood Insurance Program)	Funded By Utility	Funded From General Fund	Funded By Utility	Funded From General Fund	Funded From General Fund
	Stormwater Quality Monitoring	Primarily Funded by utility (w/ supplement from General Fund)	Funded By Utility	Funded By Utility	Funded By Utility	Funded From General Fund
	Soil Erosion and Sedimentation Control	> One Acre Funded By Land Dev. Fee. < One Acre Funded By Utility	State Administers Program	Funded By Building Permit Fees	Funded By Utility	County Administers Program
	Design of Stormwater Infrastructure	Funded By Utility	Funded From General Fund	Funded By Utility	Funded By Utility	Funded By Utility
	Construction of Stormwater Infrastructure	Funded By Utility	Funded From General Fund	Funded By Utility	Funded By Utility	Funded By Utility
	Maintenance of Stormwater Infrastructure	Funded By Utility	Funded By Both Utility and General Fund	Funded By Utility	Funded By Utility	Funded By Utility
	Public Education and Awareness	Funded By Utility	Funded By Utility	Funded By Utility	Funded By Utility	Funded From General Fund

* Source: Stormwater Utility Technical Review Committee Report, Chapel Hill, January, 1999.