TOWN OF CHAPEL HILL
STORMWATER MANAGEMENT PROGRAM
MASTER PLAN

PHASE 1 REPORT

JEWELL ENGINEERING CONSULTANTS, PC

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List of Acronyms

BMP	Stormwater Best Management Practice
BSC	Kaplan & Norton's Balanced Scorecard
CIP	Capital Improvement Project / Capital Improvement Program
CFR	Code of Federal Regulations
CRS	National Flood Insurance Program Community Rating System
CWA	Federal Clean Water Act
CWEP	Clean Water Education Partnership
CWMTF	North Carolina Clean Water Management Trust Fund
DAP	Drainage Assistance Project / Drainage Assistance Program
E&SC	Erosion and Sediment Control
EOS	Extent of Service
EPA	United States Environmental Protection Agency
ERU	Town of Chapel Hill Equivalent Rate Unit
ESRI	Environmental Systems Research Institute
FEMA	Federal Emergency Management Agency
FIS	Flood Insurance Study
FTE	Full-Time Equivalent
FY	Fiscal Year
GIS	Geographic Information System
GPS	Global Positioning System
HAZMAT	Hazardous Materials Team
HMGP	Hazard Mitigation Grant Program
IDDE	Illicit Discharge Detection and Elimination
LID	Low Impact Development

LOS	Level of Service
LUMO	Town of Chapel Hill Land Use Management Ordinance
MEP	Maximum Extent Practicable
MS4	Municipal Separate Storm Sewer System
N	Nitrogen
NCDENR	North Carolina Department of Environment and Natural Resources
NCDOT	North Carolina Department of Transportation
NCDWQ	North Carolina Division of Water Quality
NCEEP	North Carolina Ecosystem Enhancement Program
NCFPM	North Carolina Floodplain Mapping Program
NCSU	North Carolina State University
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NPDES	National Pollutant Discharge Elimination System
NRCS	US Department of Agriculture Natural Resources Conservation Service
NS	Not Supporting
NSW	Nutrient Sensitive Waters
O&M	Operations and Maintenance
OWASA	Orange Water and Sewer Authority
P	Phosphorus
PS	Partially Supporting
RCD	Town of Chapel Hill Resource Conservation District
R/W or ROW	Right-of-Way
SEPA	State Environmental Policy Act
SFR	Single-Family Residential

SWPPP	Stormwater Pollution Prevention Plan
TJCOG	Triangle J Council of Governments
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
UNC	University of North Carolina at Chapel Hill
UNC-C	University of North Carolina at Charlotte
UNC-G	University of North Carolina at Greensboro
UNC-W	University of North Carolina at Wilmington
USGS	United States Geological Survey
WPD	Town of Chapel Hill Water-Supply Watershed Protection District
WS	Water Supply
ZCP	Town of Chapel Hill Zoning Compliance Permit

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Executive Summary

The mission of Chapel Hill's Stormwater Management Program is to:

- Protect the health and safety of both the public and the ecosystem;
- Address both stormwater quality and stormwater quantity concerns; and
- Meet or exceed federal and state mandates regarding stormwater.

A dynamic, educated, and involved Chapel Hill community creates the setting for development of an outstanding Municipal Stormwater Management Program. The stormwater management challenges are not insignificant, however. Booker, Bolin, and Morgan Creeks are rated by the State of North Carolina as impaired from a water quality perspective. These same three major streams also create sources of potentially hazardous flooding for nearby residents. Many stream banks are severely eroding, impacting water quality, degrading stream habitat and aquatic life, and damaging property. Reducing nutrient loading into Jordan Lake from point and non-point sources will require control measures for new development, retrofits for existing development, and public and private expenditures from the community and region. Local drainage infrastructure is aging. There is a Town-wide need for watershed-based stormwater master planning and capital investment. Routine and remedial drainage system maintenance requirements are also growing.

The stormwater management opportunities in Chapel Hill are also numerous. After a decade of thoughtful consideration and study, Town leaders in June 2004 adopted a dedicated stormwater utility to fund a comprehensive local stormwater program. Highly qualified Stormwater Staff supported by an active Advisory Board envisions and delivers a wide range of stormwater services to Chapel Hill residents. Many local requirements for new development and re-development are advanced. Early public education and outreach programs are innovative. Ambient water quality monitoring has been underway for years providing useful baseline data. Although many stormwater programs are required by state and federal mandates, citizens agree that it is important for the community to protect surface water quality and reduce flooding problems. Stormwater is also beginning to be viewed by the community as a viable water resource asset, not merely as a liability to be managed. And the first phase of the *Stormwater Management Program Master Plan* has been completed, which is the focus of this report. Phase 1 of the Master Plan included stakeholder interviews and surveys, review of regulatory-based programs and local ordinances, analysis of current stormwater service levels, program funding, and program resources, an assessment of surface water quality and stormwater-related data and information, and defining the scope and requirements for the plan.

What were the key findings and outcomes from the foundational component of stormwater master planning? With aggressive stormwater goals established for the community and increasing state regulatory requirements, the Town's Stormwater Management Program will likely require increased funding within the next several years. The developing stormwater capital improvement program including retrofit projects may be most in need of increased future resources. The drainage assistance program has also not been funded at a level to implement a significant number of improvement projects on the ground. The second phase of the stormwater master plan will thus include an updated program cost of service and rate study for review and consideration by Town officials. To immediately identify stormwater projects most worthy of available public funding, a capital improvement project rating and prioritization model has been developed herein.

Extrapolating findings from a representative master plan survey of 793 citizens, about a third of residents report drainage or flooding-related problems affecting their property or neighborhood. Whereas the actual extent and locations of community-wide drainage problems must be determined through watershed studies and field assessments, several key policy issues arise at this early point in the program planning process. What is the source of the problem? And, what constitutes "public runoff" that should be managed by the town? A response from a resident provides one potential direction for Chapel Hill: "I agree that private property should receive funding if the runoff is from public streets." The Town's answer to these important issues will have a major role in defining the future extent, level, and cost of service of Chapel Hill's Stormwater Management Program. Many, if not a majority, of stormwater-related problems and solutions may exist beyond the traditional street right-of-way.

Surprisingly, although residents are generally aware of water quality and environmental-related issues, less than one-half realize that the Town has an established stormwater program and stormwater utility. Branding the Town's stormwater program would help expand its public visibility. With the significant UNC student, faculty, and staff population in Chapel Hill, a unique opportunity also exists to partner with the University to increase public awareness and involvement in local stormwater issues and programs. A possible step towards enhanced Town – UNC stormwater program coordination would be equitable participation from the University in the Town-wide stormwater utility fee with an appropriate credit granted for stormwater activities and best management practices underway on campus. The second phase project will include recommendations for a fee crediting system to encourage and reward beneficial stormwater management practices amongst local ratepayers.

Meeting or exceeding state and federal regulations is a prime goal of the Town's stormwater program. While NPDES Phase II stormwater requirements are already in place and expected to grow in coming permit cycles, execution of the State's pending Jordan Lake Nutrient Management Strategy will have a large impact on Chapel Hill. Though a cost of Jordan Rule implementation for Chapel Hill was not provided by the state, examining the community's population relative the total population for affected local governments offers a broad basis for estimating potential local costs. On a percentage of basin population, Chapel Hill's approximate share of the total cost of non-point source compliance may be in the ballpark of $46 million over 30 years. Direct costs for point-source compliance in Chapel Hill will be borne primarily by OWASA. Clearly, the proposed Jordan Rule is a landscape-defining set of stormwater regulations for Chapel Hill and the region.

Strengths and weaknesses of Chapel Hill's Stormwater Management Program were also identified in this discovery phase of master planning. In addition to an excellent Staff and Advisory Board, key program strengths include: stormwater management requirements for new development, early regulatory activities, support for the program from Town leaders, and customer service. Program weaknesses or challenge areas include: level of available financial resources, lack of a fee crediting policy, coordination between internal departments, public awareness of the Town's stormwater program and fee, lack of performance indicators, and limited drainage assistance services for citizens.

Upon completion in subsequent phases, the *Stormwater Management Program Master Plan* will identify and integrate strategy and tactics to advance the Council-adopted mission and goals for local stormwater services. Effectively linking the program mission and goals to prioritized, budgeted, and measurable day-to day activities and services, the Master Plan will serve as both a comprehensive strategic plan and operational business plan for the stormwater program. Fitting elements from the Balanced Scorecard framework will be applied to help track progress of the Town's Stormwater Management Program achievements.

Overview

This report provides findings and recommendations from the first phase of the Town of Chapel Hill Stormwater Management Program Master Planning Project. Building the foundation and structure for the comprehensive Program Master Plan, Phase 1 of the project focused on the following key tasks and components.

Section 1 - Stormwater Management Program Master Plan Project

- What is the Master Plan? Overview of multi-phase project plan and approach.
- Strategic vision, framework, and balanced performance measurement system for the Master Plan based on the Council-adopted program mission and priorities

Section 2 - Chapel Hill Stormwater Management Context

- Existing municipal stormwater management program and services
- Broad assessment of surface water quality, storm drainage, and flooding issues
- Interviews and workshops with Stormwater Management Program and Public Works Staff
- Workshops with Town Stormwater Management Advisory Board
- State and Federal stormwater management regulatory requirements
- Local stormwater management requirements and ordinances
- Stormwater management relative Town Comprehensive Plan
- Probable program impacts from Jordan Lake Nutrient Management Strategy
- Stormwater Capital Improvement and Drainage Assistance Programs
- Available types of stormwater-related data and information
- Current stormwater utility structure and program resources

Section 3 - Internal and External Stakeholders

- Baseline Community Survey (Sent to 3,000 Chapel Hill Residents, 793 participated)
- Stormwater Advisory Board Survey (all members of the Advisory Board)
- Stormwater Staff Survey (all members of the Stormwater staff)
- Town Manager's Office Survey (all members of the Manager's Office)
- Town Department Heads & Senior Staff Survey (all Department Heads and key staff)
- Town Advisory Boards/Commissions Survey (all Town Advisory Board/Commission Chairs)
- Town Council Survey (the Mayor and all members of Town Council)
- External Stakeholders Survey (25 external organizations)

Section 4 - State of the Chapel Hill Stormwater Management Program

- Strategic issues and priorities for the Town's stormwater program
- Program strengths, weaknesses, accomplishments, and challenges
- Opportunities for internal and external stakeholder collaboration
- Existing municipal stormwater services relative Council goals
- Program funding and preliminary benchmarking analysis
- Developing measures of success for the program

An overview of key findings and strategic recommendations from Phase 1 include the following, organized by report Section 1 through 4:

Section 1 – Stormwater Management Program Master Plan Project

1.1. On June 14, 2004, the Chapel Hill Town Council adopted the Stormwater Management Utility that established a dedicated and equitable new user fee and public enterprise to fund the municipal Stormwater Management Program. Adoption of the Stormwater Utility followed more than 10 years of Town and local stakeholder studies on stormwater management issues within the Chapel Hill community. The Stormwater Utility Enterprise is designed to fund all required and desired aspects of stormwater program and stormwater service delivery for the Town of Chapel Hill.

1.2. While delivering initial stormwater services for the Chapel Hill community, development of a comprehensive *Stormwater Management Program Master Plan (Master Plan)* was endorsed by the Town Council as an important early priority for the new Stormwater Management Utility. Working closely with the Town's Stormwater Staff and Stormwater Advisory Board, the first task was to define the type and extent of Master Plan needed and desired for Chapel Hill.

1.3. *What is the Master Plan?* With input and feedback from a wide range of citizens and stakeholders in light of regulatory requirements and stormwater-related issues in Chapel Hill, the Master Plan will identify and integrate strategy and tactics to advance the Council-adopted mission and goals for the Town's Stormwater Management Program. The desired comprehensive Master Plan will effectively serve as both a strategic plan and operational business plan for the Stormwater Management Utility and Program. In sum, the Master Plan will link the Program's core purpose and strategic goals to prioritized, budgeted, measurable day-to-day activities and services.

1.4. Serving as the guiding purpose for development of the Master Plan, the Council-adopted mission for Chapel Hill's Stormwater Management Program is to:

- Protect the health and safety of both the public and the ecosystem;
- Address both stormwater quality and stormwater quantity concerns; and
- Meet or exceed federal and state mandates regarding stormwater.

1.5. The Master Plan will also integrate stormwater-related themes from the Town's highly regarded *Comprehensive Plan* and detail specific and fitting stormwater service strategies to help achieve Chapel Hill's overall vision and community goals.

1.6. Upon completion, it is recommended that the Town perform a minimum annual review and update of the Master Plan as part of the budgeting process to ensure that fiscal and staffing resources correspond to strategic priorities and activities within the approved Plan.

1.7. To help track progress of stormwater program implementation and service delivery, the Master Plan will apply fitting concepts from Kaplan and Norton's *Balanced Scorecard (BSC)* strategic management system in developing performance targets and measures. The BSC framework encourages public and private organizations to develop balanced measures across four important perspectives: 1) financial/budgetary, 2) customer/public, 3) process/operations, and 4) learning and growth/employee development.

1.8. Within North Carolina, the City of Charlotte has been a local government leader since 1996 in applying the BSC across its range of municipal services including its highly successful stormwater utility and program.

1.9. Applications of the BSC for Chapel Hill's stormwater utility will link key activities, programs, and services to an appropriate range of "balanced" performance targets and measures. Each employee will also have an individual "scorecard" for components of their job that provide a direct tie into an overall "utility-wide" scorecard. A satisfying organizational scenario promoting both teamwork and individual success to the benefit of the Chapel Hill community, stormwater team members will see how they contribute directly to accomplishment of the Town's stormwater program mission and vision.

1.10. *What might a successful stormwater management program do for the Chapel Hill community?* The Town's Stormwater Leadership Team (defined as the Town Manager's Office, the Stormwater Staff, and the Stormwater Advisory Board) provided their vision of the "most successful" stormwater management program for Chapel Hill within the next 10 years.

Excerpts from the Leadership Team's vision include the following potential tangible outcomes and benefits from the "most successful" stormwater program:

- Chapel Hill's Stormwater Program is an active and visible branded program in the community and also considered a successful example of how to implement and manage a local program
- The Master Plan has been completed, includes clear and understandable goals, objectives, and standards of success and is being successfully implemented and updated
- Real and measurable improvements have been achieved in surface water quality and stream habitats
- The Town has sufficient drainage maintenance crews and equipment with preventative maintenance programs underway
- The program is successfully managing construction contracts for priority drainage assistance and capital improvement projects
- Upgraded storm drainage systems downtown with removal of any remaining illicit connections
- Neighborhoods have storm drain markers with public education materials distributed community-wide
- The most damaged local stream banks would be restored, stabilized, and protected
- Town provides incentives within a fee crediting system for property owners using BMPs
- Smart development would include low impact design practices such that few drainage complaints arise from new development and redevelopment
- Cooperative agreements in place with OWASA, UNC, Carrboro, Durham & Orange County for regional nutrient management
- Continued and expanded University participation in the Town's program

Section 2 – Chapel Hill Stormwater Management Context

2.1. Located within the north-central Piedmont region of the Cape Fear River Basin, Chapel Hill is a progressive and well-managed community that comprises a corporate land area of 21.1 square miles and a population of 52,397. The Town has established an Urban Services Boundary of 27.5 square miles that, by Council policy, defines its ultimate jurisdictional area.

2.2. Chapel Hill, incorporated in 1819, is the largest community in Orange County and home to the University of North Carolina (UNC), the nation's oldest public university. Major employers in Chapel Hill include UNC, UNC Hospitals, Chapel Hill-Carrboro City Schools, Blue Cross/Blue Shield of North Carolina, and the Town of Chapel Hill, respectively.

2.3. Chapel Hill receives an average of approximately 46 inches of rainfall and 5 inches of snowfall each year. In fact, precipitation levels in Chapel Hill and throughout North Carolina are generally higher than in many parts of the country. While rainfall provides life sustaining benefits, unmanaged stormwater runoff can cause (and has caused) flooding hazards for people and property along with water quality problems for receiving streams and lakes.

2.4. In developing its Stormwater Management Program Master Plan, the Town is faced with a wide variety of stormwater-related impacts, challenges, issues, and regulatory requirements to address including:

2.4.1. the need to satisfy current and future state and federal stormwater quality regulatory mandates designed to reduce non-point source pollution entering surface waters,

2.4.2. the need to control land and stream erosion and sedimentation, drainage and flooding hazards, and public and private property damage from increased stormwater runoff,

2.4.3. the need to partner in protecting the quality of Jordan Lake as a vital regional public drinking water supply source by significantly higher standards for nutrient controls,

2.4.4. the need to repair, replace, retrofit, clean, and maintain public drainage infrastructure,

2.4.5. the desire to offer expanded stormwater services to assist residents and property owners with drainage concerns and damages resulting from stormwater runoff,

2.4.6. the need to continue managing intermittent and perennial streams, floodplains, and mitigating significant flooding hazard areas,

2.4.7. the need to continue to educate and involve the public, the University, and other stakeholders in the local stormwater management program,

2.4.8. the need to protect, stabilize, and restore degraded streams and stream habitats, and

2.4.9. the need for adequate operating and capital improvement budgetary resources to satisfy regulations and provide public stormwater management services.

2.5. Chapel Hill is a NPDES Phase II municipality, having received its first Phase II regulatory permit (NCS000414) from the State of North Carolina to discharge stormwater from the MS4.

The NPDES Phase II regulatory program requires that the Town develop and implement stormwater quality programs in six areas, at a minimum:

2.5.1. Public education and outreach

2.5.2. Public involvement and public participation

2.5.3. Illicit discharge detection and elimination

2.5.4. Construction site runoff control

2.5.5. Post-construction stormwater management, and

2.5.6. Pollution prevention/good housekeeping for municipal operations.

2.6. At just over $1.7 million annually, stormwater management represents about 2.2% of the Town's FY 07/08 budget of $77,415,686. Prior to establishment of the Stormwater Utility Enterprise for FY 04/05, the Town funded stormwater management activities including system maintenance out of its General Fund and expended approximately $950,000 per year.

2.7. In establishing a Stormwater Utility, the Town of Chapel Hill joined 35 municipalities and several counties in North Carolina with a dedicated public stormwater fee and stormwater enterprise. The first stormwater utility in the state was created in Charlotte in 1993. Hundreds of other local governmental stormwater utilities have been established throughout the United States since the first utility in the nation was developed in the mid-1970s in Washington.

2.8. Chapel Hill's Stormwater Utility fee structure is based on the equitable principle of impervious surface area. Impervious surface area is the most widely used basis for determining stormwater utility fees for municipalities throughout North Carolina and the nation. Somewhat unique to Chapel Hill, however, is having only one classification of rate-payer. Most stormwater utilities have at least two classifications of customers: Single-Family Residential (SFR) and non-Single-Family Residential, for example.

2.9. For both residential and non-residential properties in Chapel Hill, the current stormwater utility fee is $39.00 per year (or $3.25 per month) for every 2,000 square feet of impervious area or portion thereof. The average SFR property contains more than 2,000 square feet of impervious area, however, which translates into an annual cost of $78 or more. The *average SFR fee rate* in Chapel Hill (i.e., $6.50 per month) is the second highest in North Carolina behind the City of Charlotte. Over 1,000 SFR properties in Chapel Hill contain more than 6,000 square feet of impervious surface area with corresponding monthly stormwater fees of $13 or higher, representing the highest SFR rates in the state.

2.10. Like most other stormwater utilities, any public or private property within Chapel Hill's town limits (not including un-annexed areas within the Urban Services Boundary) that has impervious area is subject to the municipal stormwater utility fee. State and local streets are exempt from the Town's stormwater fee, however, as are railroad rights-of-way. Minor accumulative impervious areas of less than 200 square feet are not charged.

2.11. A major stakeholder in the Town's stormwater program with a number of progressive stormwater and water resource initiatives complete or in progress, UNC is not currently a rate-

paying customer to Chapel Hill's stormwater utility. UNC property represents about 14% of the town's corporate area. Across the state, other colleges and universities in the UNC system participate in municipal stormwater fees. Continued and enhanced stormwater program collaboration between the Town and UNC is an important component for successful stormwater management within the Chapel Hill community and the region.

2.12. 15.5 Full-Time Equivalent (FTE) positions within the Town of Chapel Hill are supported by the Stormwater Utility. Supported positions reside within the Engineering (7.5 FTEs) and Public Works (8.0 FTEs) Departments, respectively. The Town's Stormwater Program is led and administered by the Stormwater Management Division of the Engineering Department. By Town policy, budgetary control is maintained at the departmental level.

2.13. Major categorical expenditures (as a percentage of the total budget) for the Town's existing stormwater program include: maintenance – 30.5%, planning and engineering – 20.5%, administration – 19.3%, capital improvements – 9.1%, public education – 6.8%, and water quality/NPDES Phase II – 6.2%.

2.14. Each of the Town's stormwater programs and services including maintenance activities are categorized in terms of the current extent and level of services provided by Chapel Hill. See Table 4 on page 44.

2.15. The Town has an active, highly dedicated, and well-qualified Stormwater Management Utility Advisory Board. There are 11 members of the Stormwater Advisory Board: 6 residential members, 4 commercial property members, and 1 UNC employee. In addition, there are two informal liaisons to the Board, 1 from OWASA and 1 from Town Council. The Board is providing a high level of service for Chapel Hill's Stormwater Program and the community.

2.16. Section 2 includes a detailed review and summary of current data maintained by the Town's Stormwater Management Program and local, regional, state, and federal agencies. Data is generally organized into the following categories: 1) aerials and planimetrics, 2) elevation and topography, 3) hydrology, 4) infrastructure, 5) land use, 6) flood hazard zones, 7) soils, 8) transportation networks, and 9) water quality.

2.17. The three major streams flowing through Chapel Hill are Booker, Bolin, and Morgan Creeks, respectively, all of which are included on the state's 303(d) listing of impaired surface waters. Required by the federal Clean Water Act, the 303(d) list developed and maintained by the NC Division of Water Quality (DWQ) shows waters which are not meeting their intended uses or which have impaired uses.

2.18. All of the stream uses within Chapel Hill are classified as C, Nutrient Sensitive Waters (NSW), and/or Water-Supply (WS). The impaired Upper New Hope Arm of Jordan Lake will subject the town to the forthcoming Total Maximum Daily Load (TMDL) and management strategy for nutrient controls. The proposed Jordan Lake Nutrient Management Strategy will contain the most stringent set of stormwater management controls in the state, including standards for new development and unprecedented guidelines for retrofits to existing development.

2.19. The Town has established monthly ambient water quality sampling sites at 13 locations (11 in Chapel Hill and 2 in Carrboro). The monitoring sites are primarily located on the three major streams. The USGS also has two real-time streamflow gages on Morgan Creek. The Town's

current ambient sampling program could be enhanced with additional resources in the future to perform in-stream wet weather sampling, biological monitoring, and physical monitoring.

2.20. In addition to their listing as water quality impaired streams, Booker, Bolin, and Morgan Creeks are major potential sources of flooding. The Town has identified more than $140 million of flood prone structures along the Bolin Creek corridor alone. While a long-term and expensive process, flood hazard mitigation may be an important component of the Town's stormwater program.

2.21. It is recognized that a majority of funding resources for major flood hazard mitigation projects may originate from state and federal sources, with potential matching funds from the local stormwater utility. Chapel Hill's stormwater utility is not currently funded at a level to manage and implement major flood hazard mitigation projects without significant grant resources and/or other non-Town revenue sources.

2.22. The Capital Improvement Program (CIP) and Drainage Assistance Program (DAP) are two of the most important and highly visible stormwater services offered by the Town. The CIP is designed for improvements and upgrades to major components of the public drainage system, such as replacing undersized or deteriorated culverts under local streets or priority stream stabilization and restoration projects. The DAP was established several years ago by the Town to provide limited technical and financial assistance to residential property owners with drainage problems.

2.23. Prior to establishment of the stormwater utility the Town did not generally have dedicated funding for stormwater-related CIPs. Even currently the level of funding for the stormwater CIP is relatively low. In FY 06/07, only $150,000 of utility resources was available to fund both the CIP and DAP, for example. While proposed funding in FY 07/08 is higher due to budget re-appropriations for several pending projects, an important theme for the Program Master Plan is to help further define adequate resources and tools to implement an effective CIP and DAP.

2.24. A preliminary stormwater CIP prioritization rating system was developed as part of the first phase of master planning. The CIP rating model is provided in Appendix 3. The model takes into account 15 criteria (such as public safety and public health, property damage, regulatory mandates, water quality benefits, permitting requirements, mitigation requirements, impact of project, cost of project, etc.) and will allow Town staff and officials to place relative weights on the various criteria. Further, the Town will also develop and maintain flexibility in defining specific ratings for each of the criteria. Importantly, once the relative weights and rating factors are established they will be applied consistently from project to project. Should controlling regulations or other environmental factors change the model framework is flexible to be adapted to new conditions.

2.25. Table 8 on page 62 provides a concise listing of key state and federal stormwater-related regulations and requirements affecting or relating to the mission of Chapel Hill's stormwater program. Water supply watershed protection, NPDES Phase II, and the proposed Jordan Lake Nutrient Management Rules are the most significant state and federal stormwater regulations affecting Chapel Hill.

2.26. The future fiscal impact of the Jordan Lake rules upon Chapel Hill's Stormwater Management Program is potentially very significant, in particular dealing with the unprecedented

requirement to control runoff from existing development. NC DWQ has estimated the total cost to affected local governments in the Jordan basin of satisfying the requirement to treat existing development as approximately $529 million over 30 years. The costs for full compliance with the Jordan rule for both point and non-point sources are estimated by the state at $905 million. The costs to local government to assess and implement stormwater management controls for existing development impose the greatest financial burden from the Jordan rules. The Jordan rule will also apply to state and federal entities including UNC and NCDOT, providing further effective opportunities for stormwater program collaboration.

2.27. While a potential cost of Jordan Rule implementation for each local government was not provided by the state, an examination of Chapel Hill's population relative the total population for affected local governments offers a broad basis for estimating local costs. On percentage of basin population, it may be inferred that Chapel Hill's approximate share of the total cost of non-point source compliance would be about 8.7% or $46 million over 30 years. Responsibility for point-source compliance in Chapel Hill will be borne primarily by OWASA.

2.28. Chapel Hill's Land Use Management Ordinance (LUMO) and Resource Conservation District (RCD) along watercourses together contain among the more restrictive set of local stormwater, surface water, and floodplain management requirements and guidelines currently in effect in North Carolina. Once the Jordan Lake rule is integrated into the Town's LUMO, local stormwater management standards for new development and redevelopment may represent much of currently known industry best practices, especially if Low Impact Development (LID) guidelines are encouraged and/or required as a means to help achieve runoff controls.

Section 3 – Internal and External Stakeholders

3.1 793 citizens representing a collective 9,000+ years of experience living in Chapel Hill were among the stakeholder participants in the first phase of stormwater master planning. In addition to citizen input and feedback through a representative master planning survey, a significant component to the first phase project included interviews and targeted group surveys with both internal and external stakeholders.

3.2 Internal stakeholders were defined as elected Town officials, Town managers, Town staff, and Advisory Boards of the Town of Chapel Hill municipal organization. Specifically, internal stakeholders included:

- all members of the Stormwater Management Advisory Board,
- the Stormwater Management Staff,
- all members of the Town Manager's Office,
- all members of Town Council,
- 39 Town Department Heads and key Senior Staff with 460 combined years of local municipal experience, and
- chairs of each of the Town Advisory Boards and Commissions.

3.3 External stakeholders were defined as management/executive-level individuals leading organizations and agencies not affiliated with the Town of Chapel Hill but that may share interest in the mission and goals of the Town's Stormwater Management Program. The administrative heads of 25 external organizations were contacted to request feedback and input to Chapel Hill's stormwater master plan.

3.4 Participating external organizations included representatives from the following:

- Town of Carrboro
- Local Home Builders Association
- Orange County Erosion & Sediment Control
- Chapel Hill Downtown Partnership
- Triangle J Council of Governments (TJCOG)
- NC Division of Water Quality/Stormwater Permitting Unit
- City of Durham Storm Water Services
- Orange County Environmental Health Department
- Orange Community Housing and Land Trust
- Morgan Creek Valley Alliance
- Durham City/County Planning, and
- Orange Soil and Water Conservation District, respectively

3.5 The University provided notable input to the initial phase of the Town's stormwater plan through representative ongoing involvement with Chapel Hill's Stormwater Management Advisory Board.

3.6 Appendix 4 and 5 contain the master matrix of stakeholder survey questions along with complete results from each of the eight targeted group surveys: Stormwater Advisory Board, Stormwater Staff, Town Manager's Office, Town Council, Town Department Heads and Senior Staff, Town Advisory Boards and Commissions, External Organizations, and Community Residents.

3.7 Section 3 includes an analysis and recommended application of comparative results from the stakeholder group surveys. Highlighted summary results from stakeholder group surveys include:

3.7.1 Overall quality of life in Chapel Hill is rated as "excellent" to "good" by most stakeholders.

3.7.2 The natural environment is important to stakeholder ratings of quality of life in Chapel Hill.

3.7.3 One of the most surprising findings from the representative citizen survey is that almost one-half of respondents "knew nothing" about the Town's stormwater management program or the stormwater utility fee. Of those aware of the program, the newspaper, tax bill, and Town meetings were most often cited as the sources of awareness.

3.7.4 Whereas most water quality programs are regulatory driven, Chapel Hill citizens agree that it is important for the Town to provide stormwater services that help reduce pollution entering local streams and lakes.

3.7.5 As expected, the perception of local surface water quality as "fair" by Stormwater Staff and members of the Stormwater Advisory Board was closest to reality for streams rated as "impaired" by the state. Citizens generally perceive stream and lake water quality as better than reality.

3.7.6 Overall, stakeholder groups perceive that stormwater-related problems (i.e., drainage, water quality, flooding, and erosion) in Chapel Hill have increased in severity in recent years.

3.7.7 Citizens overwhelmingly believe that it is important for the Town to provide stormwater services that help reduce local drainage problems.

3.7.8 Chapel Hill citizens and stakeholder groups have a good understanding of the relative significance of various potential sources of surface water pollution.

3.7.9 Stakeholder group observations of local construction sites imply an average performance for the Erosion and Sediment Control (E&SC) program.

3.7.10 There is some disparity amongst stakeholder groups in the perceived and/or observed maintenance level of Chapel Hill's drainage system.

3.7.11 There is strong consensus amongst groups regarding the importance of stormwater management to the success of the Town's Comprehensive Plan.

3.7.12 Stakeholder groups generally agree with the importance of aligning the Town's stormwater program to help support regional interests. Support for regional alignment decreases somewhat when costs for Chapel Hill citizens would increase because of regional alignment, however.

3.7.13 Mixed results are evident regarding the Town's role in funding stormwater-related projects on private property.

3.7.14 Town managers and department heads believe it would be helpful for Town employees to receive further stormwater information and training.

3.7.15 Only a small percentage of citizens have utilized the Town's website for stormwater-related information.

Section 4 – State of the Chapel Hill Stormwater Management Program

4.1 The progressive goals, community stakeholder expectations, and pending regulatory requirements for Chapel Hill's Stormwater Management Program will likely exceed available financial resources within the next several years. The Town's resources are average (on a corporate land area basis) to less than average (on a per capita basis) when compared to other municipal stormwater utilities in North Carolina. Given enhanced resources and time, however, Chapel Hill is well-positioned to become a model for municipal stormwater management.

4.2 Rankings of Stormwater Management Program priorities are provided in the following table:

Rankings of Stormwater Program Priorities
(1 = most important priority, 10 = 10th most important priority)

Program Priorities	Stormwater Advisory Board	Stormwater Staff	Manager's Office	Town Council	Composite
	Average Ranking	Average Ranking	Average Ranking	Average Ranking	Composite Ranking
Develop & implement a comprehensive Master Plan	1.27 (1)	3.40 (1)	5.50 (5)	1.00 (1)	2.79
Protect and restore natural stream corridors	5.36 (5)	6.00 (7)	2.00 (1)	3.50 (3)	4.22
Ensure compliance with federal and state regulatory mandates	4.64 (2)	3.80 (3)	3.00 (2)	6.00 (4)	4.36
Address stormwater quality	4.64 (2)	3.60 (2)	3.50 (3)	6.50 (6)	4.56
Define level of service and performance standards	5.30 (4)	3.60 (2)	8.50 (9)	2.00 (2)	4.85
Address stormwater quantity (flooding)	4.91 (3)	5.80 (6)	4.50 (4)	5.50 (5)	5.18
Develop formal public education and involvement program	5.82 (6)	5.40 (5)	6.50 (6)	6.50 (6)	6.06
Integrate programs to utilitize resources efficiently	6.55 (7)	5.20 (4)	8.00 (8)	6.00 (4)	6.44
Establish clear stormwater program leadership to public	7.45 (8)	8.60 (9)	7.00 (7)	8.00 (7)	7.76
Establish understanding of the stormwater system as a "utility"	8.64 (9)	8.40 (8)	6.50 (6)	10.00 (8)	8.39

4.3 Ranked as the most important program priority, successfully completing the Master Plan will require continued budgetary resource allocation, strong commitment and involvement from Stormwater Staff, the Stormwater Advisory Board, Town Managers, and elected officials.

4.4 While only the designated regulatory agencies can verify the Town's compliance with federal and state stormwater regulations, it appears that Chapel Hill's stormwater program generally satisfies minimum applicable regulatory standards, particularly when compared to programs being implemented in similar cities and towns in North Carolina.

4.5 While dealing with stormwater quality and quantity are significant challenges for any municipality, the Town of Chapel Hill is in the early stages of its comprehensive stormwater quality management program. Stormwater quality management requirements for new development are contained within the Town's LUMO including runoff quality controls and buffers for intermittent and perennial streams. In fact, Chapel Hill's stream buffer rules exceed state-minimum mandates.

4.6 Although local controls on new development and redevelopment match or exceed requirements of many other municipalities in North Carolina, much work is ahead to begin to address runoff from existing developments, develop a formal plan to stabilize and restore receiving streams, adopt utility-fee based incentives for enhanced stormwater quality control BMPs on private property, develop further targeted public education and involvement programs, develop watershed-based models and master plans for stormwater quality and quantity, and fully implement the CIP program to address both quality and quantity goals.

4.7 A minor amount of stream restoration may be planned as part of the FY 07/08 Burning Tree CIP project, but formal stream restoration is an expensive proposition that has been beyond the effective reach of the Chapel Hill stormwater program to date. Significant capital improvement funding will be required for the Town to make measurable progress towards stream restoration goals. The Town should continue to seek outside support from NC EEP, NC Clean Water

Management Trust Fund, and private landowners to help with implementation of local stream restoration projects.

4.8 While areas of severe flooding are limited in Chapel Hill, the cost to solve or mitigate hazardous flooding problems is usually very expensive. Strategically there are only three choices to deal with flooding situations, and the first option is not desirable: Option 1) tolerate the flooding (i.e., a potentially hazardous and/or damaging scenario), Option 2) change the nature of the flood, and/or Option 3) abandon the floodplain.

Unless the flooding situation is minor and does not put people or property in harms way, then option one is effectively not an option. Left with options two and three, both are difficult and costly. To change the nature of the flood would involve significant detention and/or major conveyance system changes within the watershed of interest. To abandon the floodplain, which in many cases is the most cost effective solution, involves acquiring and demolishing structures on property which is highly flood prone.

The hazard mitigation grant for Camelot Village is a commendable example buy-out project that employs option three. To date it is the most significant mitigation project administered by Stormwater to deal with long-established areas of severe flooding.

4.9 Overall, the Town is doing an above-average job in development and implementation of its initial stormwater public education, outreach, and involvement program. Chapel Hill's funding for the important educational program area, on a comparative percentage of total revenue, is generally higher than other municipalities in North Carolina.

In addition to storm drain markers, advertisements, brochures, the website, participation in the Clean Water Education Partnership, presentations to school and civic groups, the baseline citizen survey performed in conjunction with the first phase of the master plan exemplifies progressive educational outreach and involvement activities.

4.10 As evidenced from the baseline citizen survey results, many community residents are currently unaware of the Town's Stormwater Management Program. It is recommended that the Town "brand" the Stormwater Management Program to further raise awareness and help establish recognizable leadership to the public. This would also help establish an understanding of the stormwater system as a "utility".

4.11 Experienced stakeholder group ratings of strengths and weaknesses of the Town's Stormwater Management Program are provided in the table below:

Ratings of Town Stormwater Program Components
(3 = strength, 2 = a positive with room for improvement, and 1 = weakness of current program)

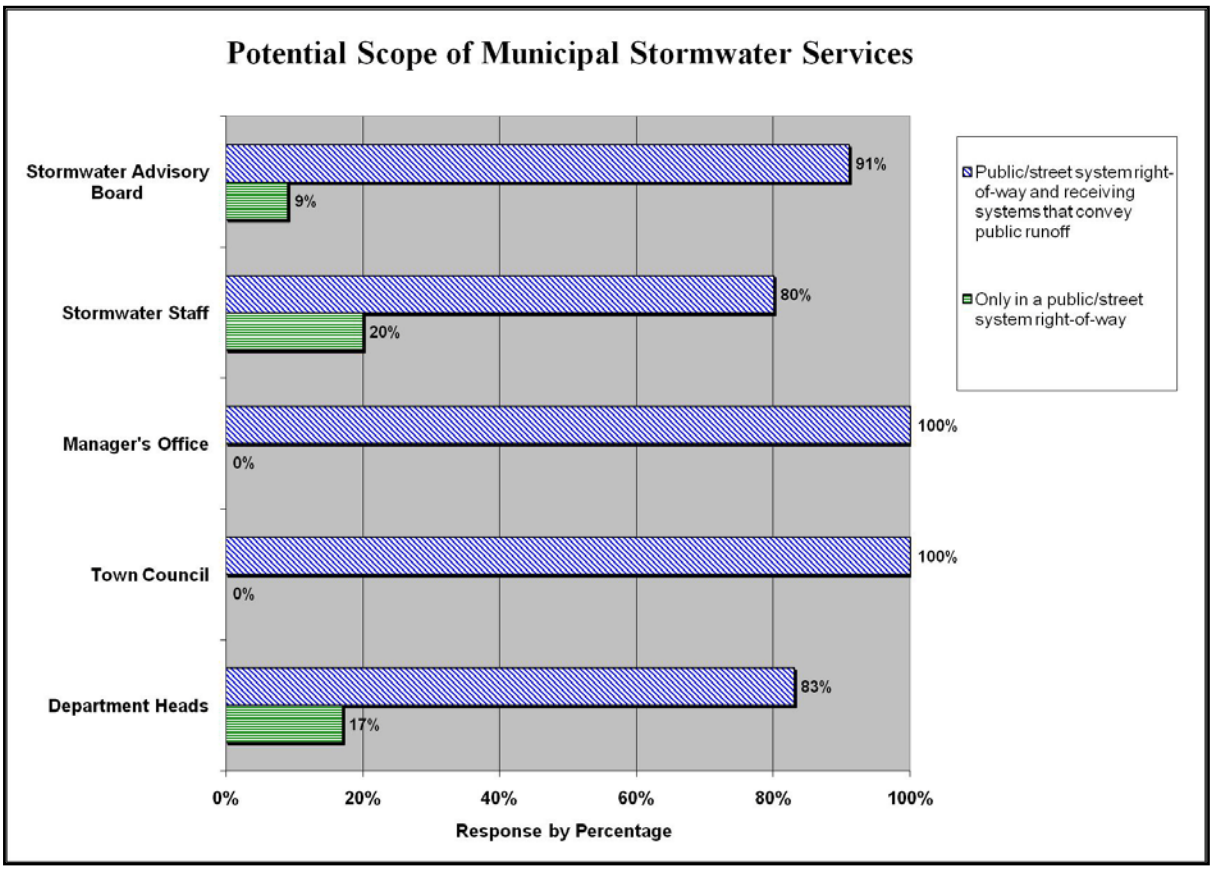
Element of Program	Stormwater Advisory Board	Stormwater Staff	Manager's Office	Composite
	Average Rating	Average Rating	Average Rating	Composite Ranking
Stormwater capital improvement programs	1.40	1.30	1.00	**1.23**
Fee crediting program	1.50	1.00	n/a	**1.25**
Public awareness and acceptance of the stormwater fee	1.60	1.20	1.00	**1.27**
Appropriate level of financial resources to implement program	1.41	1.60	1.50	**1.50**
Performance indicators for stormwater program	1.40	1.30	2.00	**1.57**
Linkage of stormwater program to Town Comprehensive Plan	1.45	1.30	2.00	**1.58**
Drainage assistance programs for residents	2.09	1.40	1.50	**1.66**
Appropriate level of staff resources to implement program	1.55	1.60	2.00	**1.72**
Stormwater system maintenance services	1.60	1.60	2.00	**1.73**
External grant opportunities to leverage local resources	1.67	2.50	2.00	**2.06**
Volunteer involvement in stormwater programs	2.18	2.00	n/a	**2.09**
Erosion and sediment control during construction	1.70	2.30	2.50	**2.17**
Local water quality sampling and monitoring program	1.68	2.00	3.00	**2.23**
Support for the program from Town Council	2.45	2.30	2.00	**2.25**
Environment of openness and desire for stakeholder input	2.18	2.60	2.00	**2.26**
Customer service on billing and other utility questions	2.41	2.60	2.00	**2.34**
Support for the program from Town Management	2.10	2.00	3.00	**2.37**
Compliance with state and federal regulatory requirements	2.15	2.80	2.50	**2.48**
Participation in the TJCOG Clean Water Education Partnership	2.57	3.00	2.00	**2.52**
Stormwater management requirements for development	1.80	2.80	3.00	**2.53**

4.12 Town stormwater services viewed by experienced stakeholders as most valuable to local residents include the following:

Public education & public involvement programs	Fixing localized drainage problems* **Note 27% of citizens report that their property or neighborhood has drainage or flooding problems*	Stream stabilization and restoration programs/projects	Flood control programs/projects
Trash & debris clean up	Mosquito control programs	Drainage assistance program	Stormwater drainage infrastructure maintenance
Street sweeping	Erosion control program	Capital improvement program	Monitoring for water quality and quantity
Drainage/pollution complaint response	Development review program/LUMO/RCD	Floodplain management program/NFIP	Leaf collection program** ***Note leaf collection program not funded by stormwater utility*

4.13 There are a number of tangible and practical opportunities for stormwater program collaboration with internal and external stakeholders. Prime opportunities exist for further program collaboration with the Town's Public Works Department, the University, Orange County Erosion & Sediment Control, and OWASA.

4.14 As evidenced in the following chart, one of the most significant findings from the initial phase of master planning is the strong desire amongst key stakeholder groups for the Town's stormwater program and utility to manage the "complete" public drainage system.



Progressive municipal stormwater utility programs have assumed *prioritized responsibility (with appropriate policies, easements, and conditions)* for managing the quality and quantity of runoff once it enters upstream street drainage inlets to connecting systems downstream. Public systems are defined as any drainage feature, natural or manmade, that receives and/or conveys at least some portion of runoff from a public street or other public land area.

4.15 A preliminary benchmarking of Chapel Hill's Stormwater Management Utility to other municipal stormwater utilities in North Carolina was performed as part of the Phase 1 Master Plan. Chapel Hill's actual budgeted revenue in FY 06/07 was $1,644,927. Mean annual revenue, on a jurisdictional area basis *using statewide utility statistics*, would be projected as $1,551,059, with a low of $354,480 and a high of $2,617,754. Mean annual revenue, on a per capita basis *using statewide utility statistics*, would be projected as $2,143,543, with a low of $579,125 and a high of $4,045,034. Also, Chapel Hill's stormwater program staffing level is about average when compared to other municipalities in the state.

1- Stormwater Management Program Master Plan Project

On June 14, 2004, the Chapel Hill Town Council adopted the Stormwater Management Utility that established an equitable new dedicated user fee to fund the municipal stormwater program and required public stormwater services. This watershed event followed more than ten years of active studies on stormwater management issues that were endorsed by Town staff, elected officials, and local stakeholders. While rainfall provides life-sustaining benefits, the increasingly negative impacts of urban stormwater runoff including land erosion, hazardous flooding, surface water pollution, and stream impairments must be managed to protect quality of life for the Chapel Hill community and region. Only a few years into its formal Stormwater Management Utility and Program, the Town of Chapel Hill has completed the initial phase of a comprehensive Stormwater Management Program Master Plan. This report represents the culmination of the foundational first phase of the Master Plan.

What is the Stormwater Master Plan?

Consistent with its long-time rankings as one of the best places to live and work in the nation, Chapel Hill has designed an open, inclusive, detailed, and high quality approach to developing the Master Plan for the Municipal Stormwater Management Program. As "master plans" mean many different things and take many different forms in municipal stormwater management, it is important to define what the Stormwater Master Plan is and what it represents for the Town of Chapel Hill.

Perhaps the most common interpretation of a "stormwater master plan" is a scientific and technical analysis of rainfall, runoff, and receiving stream conditions in a specific watershed, sub-watershed, or drainage basin of interest. Such technical studies take into account land uses, the types and sizes of drainage infrastructure, soil conditions, stream geometry and aquatic life surveys, precipitation levels, and other data to identify and model existing and potential future stormwater quality and quantity issues of concern in a localized sub-watershed, for example. Watershed studies are important and necessary components in achieving a successful local stormwater management program. The scope of Chapel Hill's Master Plan will include detailed watershed-based analyses and modeling tasks to identify and model existing and future problem areas, prioritize stormwater conveyance system and surface water improvement projects, and help identify activities to further protect and restore the quality and integrity of receiving waters.

While understanding the need for systematic, technically-oriented watershed planning and related studies, Chapel Hill recognizes the importance of developing a broader, mission-based, and comprehensive Master Plan for its Stormwater Management Program that is strategic and tactical. Incorporating citizen and stakeholder input and feedback, the Master Plan must assess the current context for stormwater management in Chapel Hill, encourage a long-term vision for the Stormwater Management Program, and also prioritize critical near-term activities. The Master Plan must capture official Council policies designed to meet community stormwater service needs along with state and federal regulatory requirements and then translate these into specific programs, services, and activities, each with defined budgetary and staffing resources.

The Master Plan for Chapel Hill's Stormwater Management Program will therefore link the Council-adopted **program mission** and **strategic goals** (see Figure 1) to day-to-day activities (including projects such as local watershed studies) that are led and implemented by the Town's dedicated Stormwater Staff and Stormwater Advisory Board. In effect, the Chapel Hill Master Plan will become a comprehensive strategic plan and operational work plan with targeted milestones and measures for continued development and implementation of the Municipal Stormwater Management Program. Each work activity of the Town's Stormwater Program will be reviewed, organized, refined as necessary, budgeted, and prioritized within the Master Plan to accomplish the program mission. The Master Plan framework will also lend itself to regular reviews and updates as stormwater regulations, citizen stormwater service needs, and community priorities change over time.

Town of Chapel Hill Stormwater Management Program Mission

It is the mission of the comprehensive Stormwater Management Program to:

- protect the health and safety of both the public and the ecosystem,
- address both stormwater quality and stormwater quantity concerns, and
- meet or exceed federal and state mandates regarding stormwater.

Stormwater Program Priorities

- Develop and implement a comprehensive Stormwater Program Master Plan that supports all of the stormwater program priorities.
- Address stormwater quantity (flooding) as an integral component within the program.
- Address stormwater quality as an integral function within the program.
- Protect and restore natural stream corridors.
- Develop a formal public education and involvement program.
- Define the level of service and performance standards for the Town's Stormwater Program.
- Ensure compliance with federal and state regulatory mandates.
- Establish clear stormwater program leadership that the public recognizes.
- Integrate programs to utilize resources efficiently.
- Establish an understanding of the stormwater system as a "utility."

Figure 1 – Council-Approved Stormwater Program Mission & Goals

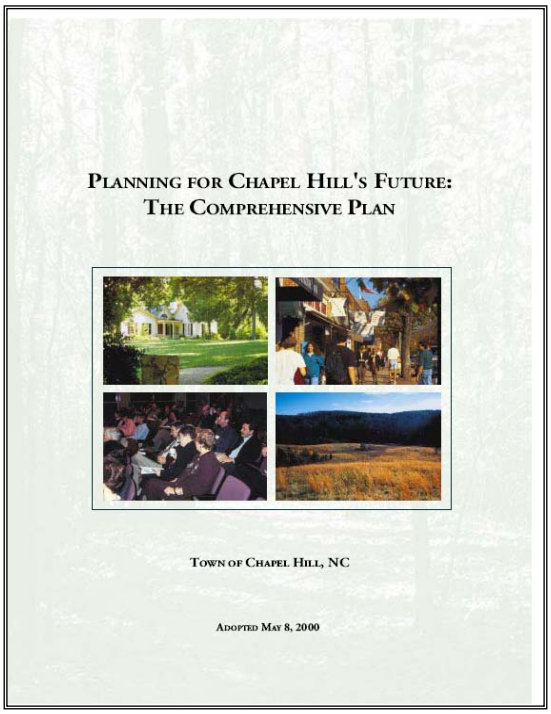
The **program mission** states the core purpose for the Town's Stormwater Management Program. In other words, the Municipal Stormwater Management Program exists to:

- **protect the health and safety of both the public and the ecosystem,**
- **address both stormwater quality and stormwater quantity concerns, and**
- **meet or exceed federal and state mandates regarding stormwater.**

While stormwater priorities and services may change over time, the program mission defines the need for an ongoing Stormwater Management Program. It will always be important to protect the health and safety of the public and the ecosystem, address stormwater quality and quantity concerns, and meet or exceed regulatory mandates regarding stormwater management. Accordingly, in development of the Master Plan, the Stormwater Program Mission is viewed as unchanging. However, the specific stormwater best management practices, services, and activities to satisfy and deliver the organizational mission will likely change over time.

Another important understanding to the developing framework of the Master Plan is the concept of a "vision". Mission and vision are interrelated but different. To explain, **program vision** articulates what the organization and community would like the Stormwater Program to become and accomplish in delivering the program mission. An initial visioning exercise was included within the first phase of the Stormwater Master Plan with highlights herein. Stakeholder feedback on program visioning led by the Town's Stormwater Advisory Board, Stormwater Staff, and Manager's Office provides an exciting and motivating glimpse into the significant benefits that may result from a well-accepted, well-funded, and well-implemented stormwater program.

Relationship between the Chapel Hill Comprehensive Plan and the Stormwater Management Program Master Plan



Chapel Hill's highly regarded Comprehensive Plan, first developed in 1989 and updated in May 2000, provides a long-term vision for Chapel Hill taking into account a number of community factors including housing and transportation, environmental and natural resources, community infrastructure, recreational and cultural resources, collaboration with the University of North Carolina (UNC), and many other essential topics. The Town's Planning Department continues to lead reviews and updates to Chapel Hill's Comprehensive Plan.

The Stormwater Master Plan will serve as both a "comprehensive plan" and detailed business operating plan specific to the Stormwater Management Program. The Stormwater Plan will integrate the stormwater-related themes from the Town's Comprehensive Plan and, upon completion, detail specific stormwater service strategies and timeframes for implementation. As designed, the Stormwater Management Master Plan will be strategically consistent with and help advance the Town's overall guiding policies and community vision identified in the Comprehensive Plan.

Multi-Phase Master Planning Approach

Laying the groundwork for the Master Plan, the first phase project included a review of the existing Town of Chapel Hill Stormwater Management Program including storm system operation and maintenance functions provided by the Public Works Department. The local and regional context for stormwater management was also reviewed and characterized along with interviews and significant targeted surveys of internal and external stakeholders. The Town's initial National Pollutant Discharge Elimination System (NPDES) Phase II stormwater permit and other regulatory-driven programs were examined. A representative baseline community survey of 3,000 Chapel Hill residents was performed in conjunction with Stormwater Staff to gauge the public's current understanding of stormwater-related issues and potential needs for municipal stormwater services. In sum, Chapel Hill recognizes that it must understand and define where its stormwater program is today in light of both regulatory and community needs as it develops the forward-looking Program Master Plan.

While this report focuses on results from the first phase, the five phases and key components envisioned by the Town for the Stormwater Management Program Master Plan are:

Master Plan Phase	Master Plan Component(s)
Phase 1	Existing Program Review, Citizen and Stakeholder Surveys, and Framework for Master Plan
Phases 2 & 3	Complete Program Master Plan and Near-Term Priority Projects
Phases 4 & 5	Implementation of Master Plan with ongoing Tracking

Even as initial components of the Master Plan are implemented as early as Phase 2, it is recommended that the Town begin performing a minimum annual review of the Plan as an integral part of the budgeting process to ensure that fiscal and staffing resources correspond to strategic priorities. As Council and community priorities may change over time, a regular Master Plan review and update process will also provide a means to adapt and adjust program and stormwater service delivery, all within the established strategic framework.

The Master Plan framework is shown in Figure 2. With reference to the planning triangle, project Phases 2 and 3 will apply the stakeholder input and understanding of existing context, conditions, issues, and probable program needs developed in Phase 1 to craft the comprehensive Master Plan. Continuing to work collaboratively with program stakeholders and the public, the Master Plan will establish specific objectives to advance each of the ten program goals. Further, under each of the objectives, specific initiatives, action items, projects, and related stormwater services will be identified and incorporated to accomplish the objectives. At that stage, municipal staff, budgetary resources, timeframes, and strategic targets and measures will be assigned to perform the desired extent and level of service for the range of stormwater activities.

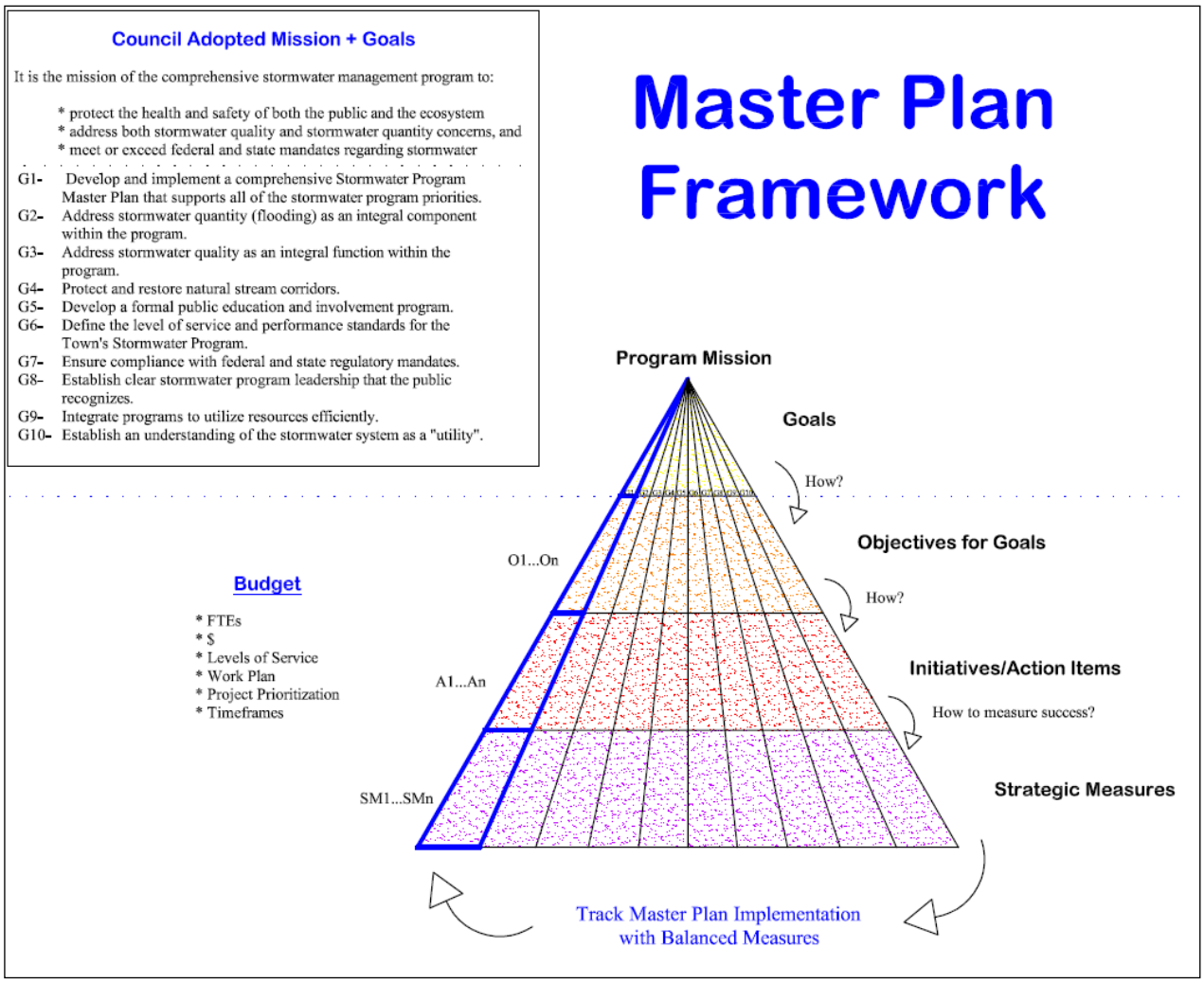


Figure 2 – Framework for the Stormwater Management Program Master Plan

Existing stormwater activities and services will be reviewed, prioritized, and placed into the Master Plan framework as fitting. Early indications from Phase 1 are that satisfying comprehensive stormwater program goals and community expectations may require additional future resources for timely development and implementation. Alternatively, goals and expectations could be modified or further extended over time to fit available resources. In any case, another value of the Master Plan is that it will allow Town Managers, elected Council, and other decision-makers to clearly see how stormwater activities, services, and resources relate to adopted strategic goals and the overall program mission. Beyond a primary focus in this project on local governmental resources for the Master Plan, continued and expanded stormwater program collaboration with UNC and other external stakeholders is seen as necessary and beneficial for the Chapel Hill community and surrounding region.

Completing the Master Plan, which may also be considered a Strategic Operating Plan, fitting balanced performance measures for stormwater services will be developed to assist the Town in tracking success of the program. Obvious measures of success include compliance with stormwater regulations and results from water quality monitoring of local surface waters, for several examples. Less obvious but critically important measures include level of citizen and utility rate-payer

acceptance and satisfaction with the Town's stormwater services. For a thorough approach, concepts from Kaplan and Norton's *Balanced Scorecard*[1] strategic management system will be used to help the Town develop measures for its stormwater services that consider four different perspectives, as may be applicable to program elements:

1) The *financial or budgetary perspective* that defines operating and capital improvement resources that will be appropriated to priority stormwater programs and services,

2) The *customer or public perspective* that describes how citizens, utility rate-payers, and other stakeholders will measure success of stormwater programs and services,

3) The *process perspective* that looks at the details of how the Town's stormwater programs and services are actually performed and delivered, and

4) The *learning and growth perspective* that looks at how staff and partnering organizations receive, organize, and apply information and knowledge to continue to improve stormwater program and service delivery over time. This perspective recognizes that a successful modern stormwater program is largely knowledge-based and processes must be established to retain and apply organizational knowledge.

The Balanced Scorecard concepts are leading business management tools that are equally applicable in governmental and non-profit organizational settings. Management tools also complement the Council-adopted goal of establishing an understanding of the stormwater system as a "utility". Within North Carolina, the City of Charlotte has been a local government leader since 1996 in applying Balanced Scorecard management concepts across its range of municipal services including the stormwater utility.

Vision for the Stormwater Management Program

What might a successful Stormwater Management Program do for the Chapel Hill community? More than satisfying state and federal regulations, the successful stormwater program can and will add significantly to quality of life in the community; enhance the protection, conservation, and restoration of surface waters and natural resources; and help promote a healthy, vibrant, and sustainable ecosystem for future generations.

As a component of the Phase 1 Master Plan, Town Managers, members of the Stormwater Advisory Board, and Stormwater Staff leaders were asked to describe their **vision** of the most successful stormwater program for Chapel Hill within the next 10 years.

Edited highlights of the Leadership Team's vision for the Stormwater Management Program include the tangible outcomes and benefits outlined in Figure 3

[1] The "**Balanced** Scorecard" strategic management system was developed by Robert S. Kaplan and David P. Norton, Harvard Business School. For more information on the Balanced Scorecard framework interested readers may refer to Kaplan and Norton's *The Strategy-Focused Organization*, Harvard Business School Press, 2000. Potential measures of success for Chapel Hill's Stormwater Program gleaned from the current project are provided in Section 4 of this report.

Highlights of the Leadership Team Vision of the Most Successful Stormwater Management Program for Chapel Hill within the next 10 Years

- The Stormwater Management Utility and Program is well-understood and well-accepted by citizens, businesses, and the community and no longer has to justify its existence
- Chapel Hill's Stormwater Program is an active and visible branded program in the community and also considered a successful example of how to implement and manage a local program
- The Master Plan has been completed, includes clear and understandable goals, objectives, and standards of success and is being successfully implemented and updated
- Real and measurable improvements have been achieved in surface water quality and stream habitats
- Improvements in water quality leads to discussions of stream segments that can be removed from the 303(d) list of impaired waters
- Program stops hazardous flooding throughout Chapel Hill while maintaining the "look" of the town
- The Town has sufficient drainage maintenance crews and equipment with preventative maintenance programs underway
- The program is successfully managing construction contracts for priority drainage assistance and capital improvement projects
- Town becomes a participant in the Community Rating System (CRS) program under the National Flood Insurance Program (NFIP) and is rated a Class 1 community
- All structures have been removed from regulatory floodways, stream and adjacent land areas have been restored, and the Town is utilizing future conditions flood maps for floodplain management
- Upgraded storm drainage systems in the downtown area with removal of any remaining illicit connections
- Neighborhoods have storm drain markers with public education materials distributed community-wide
- The most damaged local stream banks would be restored, stabilized, and protected
- Town provides incentives within a fee crediting system for property owners using appropriate BMPs
- Smart development would include low impact design practices such that few drainage complaints arise from new development and redevelopment
- Cooperative agreements in place with OWASA, UNC, Carrboro, Durham & Orange County for regional nutrient management
- Continued and expanded University participation in the Town's program
- Program has active citizen involvement in stream watches, cleanup, monitoring, etc.
- A high quality stormwater program that is a true utility that is separate from other departments
- Chapel Hill's role in helping protect Jordan Lake as a regional drinking water source is well-defined
- Public art incorporating stormwater management and water resource conservation themes would beautify the community
- Effective enforcement and community compliance with stormwater management requirements

Figure 3 – 10-Year Vision for the Stormwater Management Program

2 - Chapel Hill Stormwater Management Context

Incorporated in 1819, Chapel Hill is the largest community in Orange County and home to the University of North Carolina (UNC), the nation's oldest public university. Major employers in Chapel Hill include UNC, UNC Hospitals, Chapel Hill-Carrboro City Schools, Blue Cross/Blue Shield of North Carolina, and the Town of Chapel Hill.

Located within the north-central Piedmont region of the Cape Fear River Basin (see Figure 4 from NCDENR), Chapel Hill is a progressive and well-managed community that comprises a land area of 21.1 square miles and has a population of 52,397. The Town has established an Urban Services Boundary of 27.5 square miles that, by Council policy, defines its ultimate jurisdictional area.

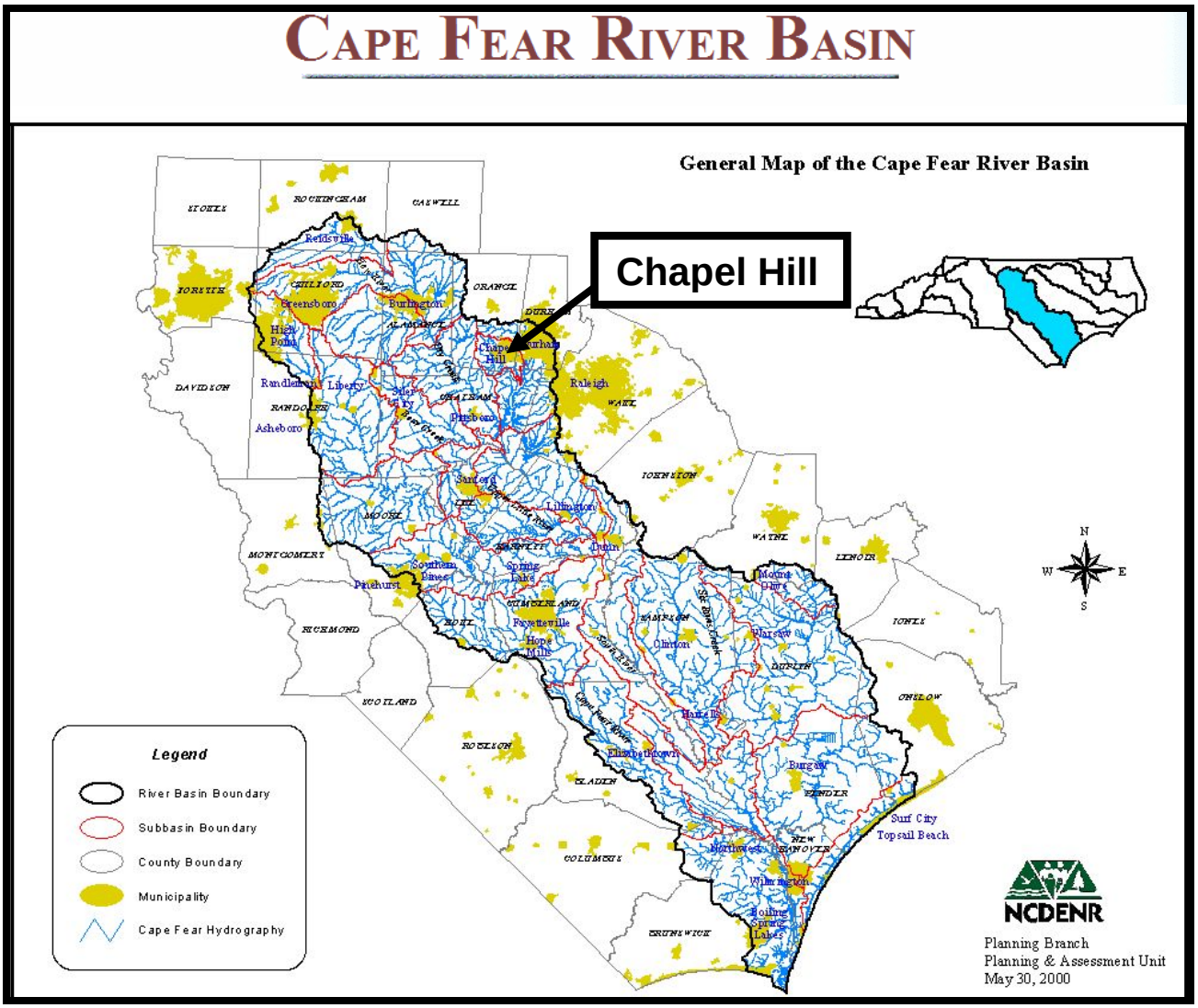


Figure 4 – General Map of the Cape Fear River Basin (Source: NCDENR, 2000. Reference to Chapel Hill added.)

Chapel Hill receives an average of approximately 46 inches of rainfall and 5 inches of snowfall each year. In fact, precipitation levels in Chapel Hill and throughout North Carolina are generally higher than in many parts of the country. In addition to its important benefits, rainfall in urban areas such as Chapel Hill also provides increasingly higher levels of surface runoff that must be safely managed and conveyed by the municipal storm drainage system and receiving streams.

Highlighted within the mission statement for the Chapel Hill Stormwater Program, stormwater runoff has both quantity (i.e., rate and volume) and quality (i.e., pollutant load) components. As communities grow and develop with more impervious land uses, the rate and volume of stormwater runoff increases while the quality of the runoff decreases as pollutants are washed off from highways and streets, parking lots, buildings and houses, sites under construction, and other land areas (i.e., non-point sources) into nearby storm drains and receiving streams and lakes. According to the NC Division of Water Quality (DWQ), non-point source pollution is the leading cause of impairment to receiving surface waters in Chapel Hill, across North Carolina, and the nation. In fact, each of the three major streams in Chapel Hill has been listed as impaired by DWQ.

As an estimate to broadly illustrate the loading magnitude of local stormwater, average precipitation levels over Chapel Hill's current town limits translate into about 17 billion gallons of stormwater per year. For a reference point, annual potable water usage for the Orange Water and Sewer Authority (OWASA) service area (80,000 people) is approximately 3.6 billion gallons per year. OWASA also treats about 3.1 billion gallons of wastewater each year. While not all of the estimated 17 billion gallons of stormwater runs off into storm sewers and streams as losses occur due to infiltration and evapotranspiration, surface runoff and accompanying pollutant loads that must be effectively managed and mitigated continue to increase with community growth. Thus, in developing its Stormwater Program Master Plan, Chapel Hill is faced with a wide variety of stormwater-related impacts, challenges, issues, and regulatory requirements to address including:

- the need to satisfy current and future state and federal stormwater quality regulatory mandates designed to reduce non-point source pollution entering surface waters,
- the need to control land and stream erosion and sedimentation, drainage and flooding hazards, and public and private property damage from increased stormwater runoff,
- the need to protect the quality of Jordan Lake as a vital regional public drinking water supply source by significantly higher standards for nutrient controls,
- the need to repair, replace, retrofit, clean, and maintain public drainage infrastructure,
- the desire to offer expanded stormwater services to assist residents and property owners with drainage concerns and damages resulting from stormwater runoff,
- the need to continue proactively managing intermittent and perennial streams, floodplains, and mitigating significant flooding hazard areas such as the proposed Camelot Village buy-out project along the Bolin Creek floodplain,

- the need to continue to educate and involve the public, the University, and other stakeholders in the local stormwater management program,
- the need to protect, stabilize, and restore degraded local streams and stream habitats (see Figure 5 for an example degraded stream site along Booker Creek), and
- the need for continued adequate operating and capital improvement budgetary resources to satisfy regulations and provide public stormwater management services.

Figure 5 – Booker Creek below Willow Drive (Source: NCEEP, 2004)

Chapel Hill's National Pollutant Discharge Elimination System (NPDES) Phase II permit (#NCS000414) is already placing new regulatory-driven demands for stormwater quality management services to reduce pollution conveyed to receiving waters from the Municipal Separate Storm Sewer System (MS4). The forthcoming Jordan Lake nutrient TMDL will place additional and more stringent requirements for stormwater nutrient controls upon the Chapel Hill community and surrounding region, including an unprecedented requirement to identify retrofit controls for existing development.

With the broad scan of community context and general stormwater management issues introduced above, the remainder of Section 2 provides summary findings related to the following topics reviewed as part of Phase 1 to organize a baseline of information for building the forward-looking Stormwater Management Program Master Plan:

- Existing municipal Stormwater Management Program and services
- Organization of stormwater program and service delivery in Chapel Hill
- Current stormwater utility structure and budgetary resources
- Stormwater Management Utility Advisory Board
- Available types of stormwater-related data and information
- Broad assessment of surface water quality and flooding hazards
- State and federal stormwater regulatory requirements
- Local stormwater management requirements and ordinances
- Stormwater capital improvement and drainage assistance programs
- Developing Jordan Lake Nutrient Management Strategy

Chapel Hill's **Comprehensive Plan** and accompanying **Annual Data Book** provide an extensive listing of general community data and trends such as demographics, housing, and education, the 12 major planning themes, overall vision, and so forth.

A major theme derived from the Comprehensive Plan applicable to the Stormwater Master Plan is the community's strong desire to protect water and other natural resources as integral components to maintaining and improving quality of life in Chapel Hill.

Existing Municipal Stormwater Management Program

The history of the Town of Chapel Hill is closely linked to the establishment and growth of the University of North Carolina. While the relationship with the University remains essential to the identity of Chapel Hill and ultimate success from local stormwater management programs, today the Town provides a wide range of public services and facilities including police and fire protection and emergency services, a fare-free bus system, traffic control and transportation management, street maintenance and construction, planning and zoning, community housing and development, engineering, building inspections and code enforcement, **stormwater management**, **street sweeping and drainage system maintenance (within street right-of-way)**, libraries, solid waste and yard waste collection, greenways, and parks and recreation.

Chapel Hill has been operating under a progressive Council/Manager form of local government for many years. The Town Manager is the Chief Administrative Officer for the municipal organization reporting to the elected Mayor and Council, all serving the citizens of Chapel Hill.

Figure 6 gives an overview of the Town's organizational structure.

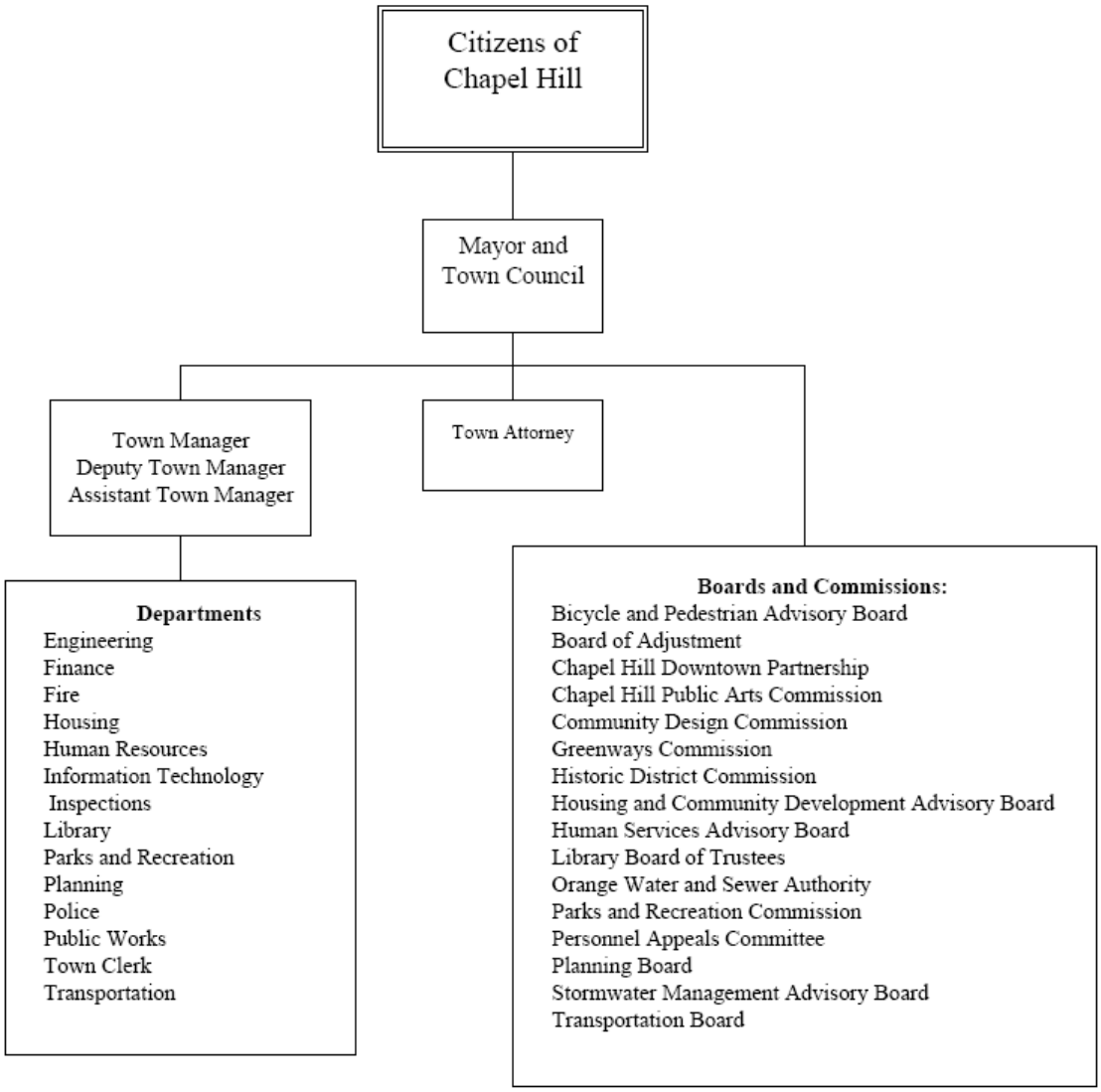


Figure 6 – Town of Chapel Hill Organizational Chart (Source: Town of Chapel Hill)

The Town's projected budget in Fiscal Year (FY) 2007-2008 to provide the complete range of municipal programs and services totals just over $77.4 million.[2] The Town has 671 employees serving Chapel Hill residents and the community.

Figure 7 from the Town's budget document shows the breakdown of projected budgetary expenditures by percentages for municipal services in FY 07-08. At just over $1.7 million, stormwater management represents about 2.2% of the Town's overall projected budget.

[2] Reference to Town of Chapel Hill Fiscal Year 2007-2008 Recommended Budget Documents

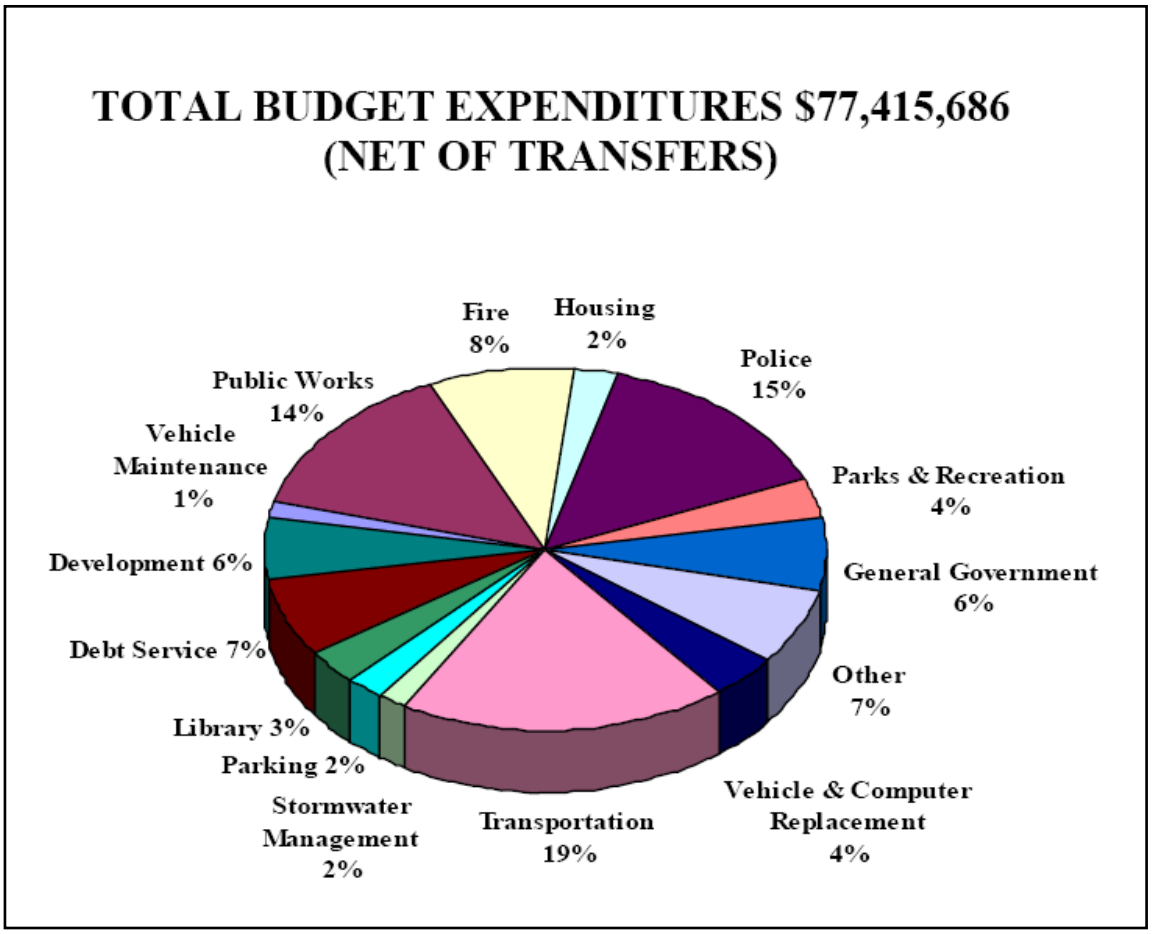


Figure 7 – Projected Budget Expenditures for the Town of Chapel Hill (FY 07-08) (Source: Town of Chapel Hill)

After previously funding street sweeping, right-of-way drainage system maintenance, and stormwater plan review from the municipal general fund, the Town established a Stormwater Management Utility Enterprise on June 14, 2004 (effective beginning FY 2004-2005) to provide dedicated, user fee-based revenues to support growing needs for a more comprehensive municipal stormwater management program. 35 cities and towns in the state along with several counties have created stormwater utilities since Charlotte was the first North Carolina city to do so on January 1, 1993. The largest municipal stormwater program in North Carolina, Charlotte's successful and nationally recognized stormwater utility has since grown to an approximate $37 million a year program with 92 full-time staff.

In recent fiscal years prior to FY 04-05, the Town of Chapel Hill budgeted around $950,000 annually from the general fund for stormwater management and system maintenance services delivered by the Engineering ($250,000) and Public Works ($700,000) Departments, respectively. With implementation of the Stormwater Utility, the **Stormwater Management Division** was created within the **Engineering Department** to administer and coordinate the Town's stormwater programs, particularly the NPDES Phase II regulatory requirements. Street sweeping and drainage system maintenance services continue to be provided by the **Streets & Construction Services Division** of the **Public Works Department**. The municipal stormwater program in Chapel Hill prior to

establishment of the stormwater utility was described in previous studies as minimal and primarily reactive with regards to system maintenance when compared to other similar-sized communities.

The original budget for the stormwater management program under the utility enterprise in FY 04-05 was projected at $1.76 million and later estimated downward to $1.65 million. Even under the reduced original budget, the stormwater utility provided an increase of approximately $697,000 in budgeted annual expenditures for stormwater management in Chapel Hill. Initial operating expenses in FY 04-05 included a one-time transfer of $402,000 to cover prior year expenditures associated with establishing the stormwater utility.

The total stormwater program budget remained essentially unchanged for FY 05-06 at $1.64 million. Actual revenues in FY 05-06 were $1.688 million, slightly above the budgeted revenues. Actual expenditures in FY 05-06 were just over $1.1 million. Withdrawing resources from the stormwater fund balance, the revised budget for FY 06-07 increased slightly to $1.8 million. The estimated program expenditures for FY 06-07 total about $1.65 million.

As noted, total projected budgetary expenditures for the Stormwater Management Program in FY 07-08 are just over $1.7 million. While Engineering and Public Works are the primary stormwater service providing departments, several other departments including Inspections and Finance have received minor supplemental funding in previous years from the stormwater utility enterprise for delivery of stormwater-related services.

The FY 07/08 allocation of $500,000 in stormwater utility revenues is designated to supplement Public Works for sweeping and drainage infrastructure maintenance services (within the street right-of-way). The total proposed stormwater utility supplement to the general fund in FY 07-08 is $32,000 less than in FY 06-07 based on documented street sweeping and storm drainage system maintenance activities by Public Works.

Table 1 provides a summary of budgeted revenues and expenditures for the Stormwater Management Program since inception of the stormwater utility enterprise fund in FY 04-05. By Town policy, budgetary control within the Chapel Hill municipal organization is maintained at the departmental level.

Table 1 – Summary of Revenues and Expenditures for Town Stormwater Program

	FY 04/05 Original Budget	FY 04/05 Revised Budget	FY 04/05 Actual	FY 05/06 Original Budget	FY 05/06 Revised Budget
Revenues					
Stormwater Fees	1,760,000	1,760,000	1,708,329	1,635,330	1,635,330
Fee Exemption	-	(6,500)	(1,836)	(6,500)	(6,500)
Transfer from General Fund	-	6,500	1,836	6,500	6,500
Interest Income	-	-	8,585	-	-
Other Income	-	-	1,800	3,600	3,600
Appropriated Fund Balance	-	-	(251,048)	-	4,872
Total	$1,760,000	$1,760,000	$1,467,666	$1,638,930	$1,643,802
Expenditures					
Personnel	306,422	304,422	289,168	423,181	394,731
Operating Costs	1,397,947	1,399,947	1,178,498	949,439	1,012,761
Capital Outlay	55,631	55,631	-	266,310	236,310
Total	$1,760,000	$1,760,000	$1,467,666	$1,638,930	$1,643,802

	FY 05/06 Actual	FY 06/07 Original Budget	FY 06/07 Revised Budget	FY 06/07 Estimated	FY 07/08 Recommended Budget
Revenues					
Stormwater Fees	1,649,651	1,641,327	1,641,327	1,641,327	1,660,000
Fee Exemption	(2,784)	(6,500)	(6,500)	(3,038)	(4,000)
Transfer from General Fund	2,784	6,500	6,500	3,038	4,000
Interest Income	34,426	-	-	8,595	-
Other Income	4,749	3,600	3,600	3,600	3,600
Appropriated Fund Balance	-	-	157,477	-	69,093
Total	$1,688,826	$1,644,927	$1,802,404	$1,653,522	$1,732,693
Expenditures					
Personnel	713,479	427,390	416,050	408,639	555,135
Operating Costs	406,484	973,515	1,125,719	985,247	1,077,558
Capital Outlay	-	244,022	260,635	259,636	100,000
Total	$1,119,963	$1,644,927	$1,802,404	$1,653,522	$1,732,693

Whereas only 1 full-time stormwater engineer and 1 full-time engineering technician were budgeted in previous years under the Engineering Department's general fund, 4 full-time positions were created in FY 04-05 under the utility to staff the new Stormwater Management Division:

- Stormwater Management Engineer (serves as the Stormwater Division Manager),
- Assistant Stormwater Management Engineer,
- Engineering Technician, and the
- Community Education Coordinator.

Within the Drainage & Sweeping Section of the Streets & Construction Services Division of the Public Works Department, 7 maintenance positions are supported by the stormwater utility. With a total annual budget of almost $11 million, the Public Works Department provides a range of municipal maintenance services beyond street sweeping and drainage infrastructure maintenance. The majority of Public Works' 114 employees are assigned to non-stormwater maintenance activities including solid waste collection, fleet maintenance, building and grounds maintenance, traffic signals and markings, snow removal, and general administration. Public Works also provides curbside leaf collection services in the fall. In accordance with state authorizing general statutes, Chapel Hill's proprietary stormwater utility enterprise provides funding support for stormwater-related services.

In FY 05-06, a new Accounting Technician for the Stormwater Management Division and 20% of a Surveyor position brought the Full-Time Equivalent (FTE) jobs within the Engineering Department supported by the stormwater utility to 5.5. Stormwater-funded and supported positions were unchanged for FY 06-07.

Under a large and growing workload, two new full-time positions within the Stormwater Management Division of Engineering and one full-time position within Public Works were proposed in the Manager's recommended budget for FY 07-08:

- Stormwater Staff Engineer to assist with stormwater plan review, conduct construction and maintenance inspections, and assist with drainage improvement requests;
- Stormwater Engineering Technician that will assist in NPDES Phase II program compliance, particularly mapping the drainage system and performing the illicit discharge detection and elimination program.
- Vactor truck operator within Public Works to operate the new Vactor truck.

Table 2 provides a summary of the 15.5 Full-Time Equivalent (FTE) staff positions within the Town of Chapel Hill supported by the stormwater utility enterprise fund as of FY 07-08. Stormwater-supported positions reside within the Engineering and Public Works Departments, respectively. While a minor amount of funding (approximately 0.4% of total utility revenue) was allocated in recent years to the Finance Department for support in stormwater fund accounting, cash handling, and billing functions, no FTEs are assigned to Finance for program master planning purposes. Similarly, the temporary, part-time intern position within the Stormwater Management Division is not included within the FTE count.

Table 2 – Municipal Staff Positions Supported by the Stormwater Management Utility (As of FY 07-08)

Engineering Department	Public Works Department
Engineering Director (30%)	Drainage Maintenance Supervisor
Stormwater Management Engineer	Drainage Crew Supervisor
Assistant SW Management Engineer	Drainage Crew (3)
Engineering Technician	Street Sweeper Operators (2)
Community Education Coordinator	Vactor Truck Operator (1)
Accounting Technician	**FTEs = 8.00 (FY 07/08)**
Surveyor (20%)	
SW Management Staff Engineer	
Engineering Technician	
FTEs = 7.50 (FY 07/08)	

Current Stormwater Services

What stormwater programs and services are currently offered and provided for residents and the Chapel Hill community?

What are the extents and levels of current municipal stormwater programs and services?

How is the Town utilizing appropriated budgetary and staff resources under its stormwater utility enterprise?

Answering these questions helps establish a "service baseline" for use in developing the Stormwater Management Program Master Plan. A summary and assessment of current municipal stormwater services was developed through interviews and surveys with experienced staff coupled with analysis of budgeted resources within the stormwater fund. In delivery of local governmental services including stormwater management services, Council-appropriated budgets are a primary indicator of program and service priorities, extents, and levels.

To clarify what is meant by "Extent of Service" and "Level of Service" with regards to the Town's Stormwater Management Utility and Program, the following definitions and framework in Table 3 are recommended starting points for the Master Plan.

Extent of Service (EOS)
>Defines the geographic area(s) covered by the Town stormwater program/service

>Defines which physical stormwater structures, drainage system components, and receiving streams are within the scope of the Town stormwater program/service

Level of Service (LOS)
>Defines the performance standards and/or frequency to which a specific Town stormwater program/service is provided

>May also define the relative timeframe for addressing a specific Town stormwater program/service and/or stormwater capital improvement project(s)

Table 3 – Level of Service (LOS) Definitions for Town Stormwater Services

Level of Service (LOS)	Program Management and Regulatory Compliance Activities	Operation and Maintenance Programs	Capital Improvement Program (CIP)
V	Comprehensive program planning, aggressive regulatory compliance, best in class practices, full program implementation	Fully preventative and proactive maintenance program, best in class practices	10-year program *(All known CIPs could be completed within 10 years)*
IV	Basin master planning, above average regulatory compliance, systematic program implementation	Fully routine and partially inspection-based maintenance	20 to 30-year program
III	Limited planning, baseline regulatory compliance, priority program implementation	Limited routine maintenance, limited inspection-based maintenance, partially reactive maintenance	30 to 40-year program
II	Minimal to no planning, below average regulatory compliance, partial program implementation	No routine or inspection-based maintenance, reactive-based maintenance program only	40 to 50-year program
I	No planning, non-regulatory compliant, minimal to no program implementation	Minimal to non-responsive maintenance program	50-year + program

The LOS definitions may be reviewed further as part of the Phase 2 Master Plan, if desired by the Town. Detailed LOS definitions may also be developed for *each component of the Town's stormwater program*, e.g., program administration, public education, water quality, planning and engineering, CIP, street sweeping, drainage system maintenance, and others as needed.

Table 4 provides a summary of stormwater services and programs currently provided under the Town of Chapel Hill's stormwater management utility. LOS evaluations for current stormwater programs and services are given based on the LOS framework from Table 3. Program strengths and challenge areas are expounded upon in Section 4 of this report.

Table 4 – Current Town of Chapel Hill Stormwater Services

Stormwater Management Program / Service	Department / Division	Extent of Service (EOS)	Level of Service (LOS)
NPDES Phase II Programs:			
Public education & outreach	Engineering / Stormwater Management	Town-wide program	IV
Public involvement & participation	""	""	III
Illicit discharge detection & elimination	""	""	II
Construction site runoff control	Orange County E&SC	""	III
Post-construction stormwater management program	Engineering / Stormwater Management	""	IV
Pollution prevention & good housekeeping for municipal operations	""	Town-owned facilities and municipal operations	III
Respond to storm drainage, erosion, and/or pollution complaints from citizens and property owners Respond to requests for stormwater-related information	Engineering / Stormwater Management + Public Works/Streets & Construction Services	Town-wide	III
Drainage Assistance Program (DAP)	Engineering / Stormwater Management	Town-wide program designed to assist residential property owners	II

Table 4 – Current Town of Chapel Hill Stormwater Services (continued)

Stormwater Management Program / Service	Department / Division	Extent of Service (EOS)	Level of Service (LOS)
Capital Improvement Program (CIP)	Engineering / Stormwater Management	Town-wide	II
Stormwater Plan Review for Development/LUMO	Engineering / Stormwater Management	Town-wide	IV
RCD stream identification, stream mapping, and RCD program enforcement	Engineering / Stormwater Management Inspections	Town-wide	IV
Administer local floodplain management program Manage hazard mitigation grant program /projects Coordinate annual review of Hazard Mitigation Plan	Engineering / Stormwater Management	Town-wide	III
Development and implementation of Stormwater Master Plan	Engineering / Stormwater Management	Town-wide program planning scope, project underway	-
Ambient water quality sampling program	Engineering / Stormwater Management	Monthly samples at 13 representative sites in Chapel Hill	III
Administer stormwater utility billing databases and related billing customer service	Engineering / Stormwater Management + Finance	All stormwater utility fee rate-payers in Chapel Hill	III
Inventory of MS4 infrastructure	Engineering / Stormwater Management	Town-wide	II
Stormwater Advisory Board (monthly meetings)	Engineering / Stormwater Management	Town-wide program planning scope	V
Stormwater GIS/data management	Engineering / Stormwater Management	Town-wide program scope	III
Stormwater informational website & main phone line	Engineering / Stormwater Management	Covers full scope of stormwater program, available to anyone	IV

Table 4 – Current Town of Chapel Hill Stormwater Services (continued)

Stormwater Management Program / Service	Department / Division	Extent of Service (EOS)	Level of Service (LOS)
Street sweeping	Public Works/Streets & Construction Services (2 sweeper trucks)	Downtown streets (twice per week) Major streets (once per week) Residential streets (once per 6 weeks) (No sweeping of ribbon pavement streets, curb and gutter streets only)	III
Storm drainage infrastructure maintenance	Public Works/Streets & Construction Services (1 drainage maintenance crew)	Drainage infrastructure within Town street R/W only (No drainage system maintenance on NCDOT roads)	III
Open stream channel maintenance (debris & sediment removal) within street R/W	Public Works/Streets & Construction Services (1 drainage crew)	Major open stream channels along Bolin, Booker, and Morgan Creeks within Town street R/W only (typically upstream and downstream of culverts/road crossings)	III
Drainage ditch maintenance	Public Works/Streets & Construction Services (1 drainage crew)	Drainage ditches along street R/W	III
Inspections of constructed public and private projects per Town development requirements	Inspections	Town-wide program scope	III
Stormwater BMP Inspection Program (annual inspection)	Engineering / Stormwater Management	Town-wide program scope, under development	II

Current Town stormwater services are next categorized by major program function in Table 5 and Figure 8. (Budget resource estimates by stormwater program function are based on FY 06-07 data as the FY 07-08 budget had not been approved by Council at the time of this component of the Phase 1 project.) Approximate expenditures by program function are the primary goal for planning purposes. Annual funding allocated to the stormwater management program and specific activities within the program fund also provides another basis for estimating levels of service.

Table 5 – Stormwater Services by Function under the Stormwater Management Utility

Program Function	Lead Department / Division	Town Staff (FY 06-07)	Estimated Budget (FY 06-07) + *% of Total Budget*
Administration (Program management, utility billing & administration)	Engineering / Stormwater Management	Engineering Director (30%) Stormwater Management Engineer (Division Mgr.) Accounting Technician	$317,071 *19.3%*
Water Quality / NPDES Phase II	Engineering / Stormwater Management	Engineering Technician	$101,291 *6.2%*
Planning & Engineering	Engineering / Stormwater Management	Assistant Stormwater Management Engineer Surveyor (20%)	$336,835 *20.5%*
Public Education	Engineering / Stormwater Management	Community Education Coordinator	$112,091 *6.8%*
MS4 Operation & Maintenance	Public Works / Streets & Construction Services	Drainage Maintenance Supervisor Drainage Crew Supervisor Drainage Crew (3) Street Sweeper Operators (2)	$500,989 *30.5%*
Capital Improvement Program (includes CIP+DAP)	Engineering / Stormwater	(Administration + Planning & Engineering Staff)	$150,000 *9.1%*
Inspections & Code Enforcement	Inspections	Inspections Director (10%) Assistant Director (35%) Code Enforcement Officer (40%) Building Inspector (10%)	$40,000 *2.4%*
Debt Service	Not currently applicable. To date the Town of Chapel Hill has not issued general obligation or revenue bonds dedicated for stormwater management operational services or stormwater capital improvement projects.		
Capital Reserve	FY 06-07 appropriation to stormwater capital reserve fund		$86,650 *5.3%*
Totals		**13.45 FTEs (as of FY 06-07)**	**$1,644,927** ***100%***

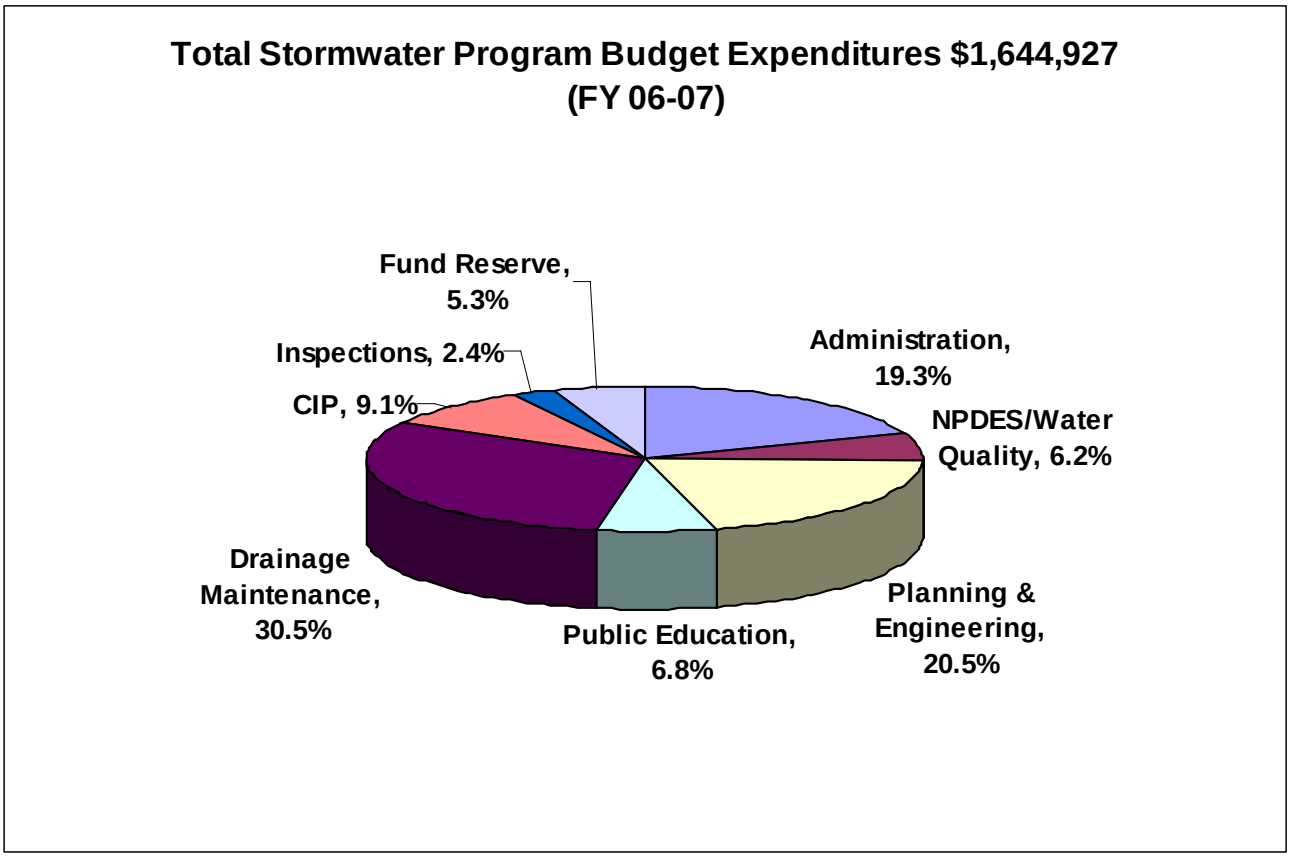


Figure 8 – Stormwater Expenditures by Program Function (FY 06-07)

For Town budget development and reporting purposes, stormwater expenditures (and those of other departments) have typically been categorized broadly in terms of total personnel, operations, and capital costs. A more detailed breakdown of the stormwater program budget by major function helps define a resource allocation baseline for building the master plan.

Estimated budget expenditures for the stormwater program were developed by allocating personnel, operating, and capital appropriations to each of the major functions: administration, NPDES/water quality, planning and engineering, public education, drainage system maintenance, CIP (which includes both the capital improvement and drainage assistance programs), inspections and code enforcement, and fund reserve.

While the breakdown of current budgeted program costs is detailed, the expenditure allocations are not intended to be an exhaustive analysis to describe costs to the nearest dollar, particularly with respect to salary expenditures for individual positions. Rather the purpose is to estimate expenses by major function to within several thousand dollars or less (i.e., typically less than 1% of total budgeted revenue) sufficient to make strategic and operational-level decisions regarding existing and future resource allocations for program master planning and program implementation. Program expenditures by stormwater management function also facilitate a preliminary benchmarking analysis of Chapel Hill's resources to other established municipal stormwater utilities. Section 4 provides an initial comparison of Chapel Hill's stormwater utility resources to those of 16 other municipal stormwater programs in North Carolina.

Stormwater Management Utility

As early as June 1998 the Chapel Hill Town Council formed a work group to investigate the feasibility of establishing a stormwater utility in Chapel Hill. Dr. Arthur Werner chaired the initial "Stormwater Utility Technical Review Committee" which led to a stormwater utility feasibility report issued in January 1999. The 1999 report recommended that Chapel Hill pursue development of a municipal stormwater utility enterprise. At that point in time, major municipal stormwater utilities had been established in Charlotte, Greensboro, Durham, Winston-Salem, and Fayetteville, cities which were subject to Phase 1 of the NPDES stormwater requirements. The report also recommended that a multi-jurisdictional utility could possibly be created to serve the Town of Chapel Hill, Town of Carrboro, and additional portions of southern Orange County.

While Carrboro officials later decided not to participate in a multi-jurisdictional stormwater utility, the foundational work of Dr. Werner's committee and Town Engineering Department Staff led Chapel Hill to hire a consulting firm in 2002 to support development of a stormwater utility. Following several years of program policy and utility database development work managed by the Engineering Department, Chapel Hill's Council adopted the stormwater utility in 2004 to begin funding a more comprehensive stormwater management program in FY 2004-2005. Chapel Hill's Stormwater Management Utility Ordinance was adopted as local code Chapter 23, Article I (see Appendix 1).

What is the basis for the stormwater utility fee?

The **total amount of impervious surface area** (building rooftops, parking lots, driveways, other paved surfaces, etc.) on a property serves as the equitable basis for Chapel Hill's current stormwater utility fee structure. In fact, impervious surface area is the most widely used principle for determining stormwater utility fees in North Carolina and beyond. Chapel Hill's stormwater utility is somewhat unique, however, in that it recognizes only one category or classification of fee rate-payer. Any property in Chapel Hill with impervious area is subject to the Town's stormwater fee. However, there is no distinction made between residential and non-residential properties. Other stormwater utilities in North Carolina and many throughout the United States have been established with at least two categories of rate-payers (i.e., utility customers): Single-Family Residential (SFR) and Non-SFR. Stormwater fee rates for SFR property owners are commonly assigned a flat rate regardless of actual impervious area or placed into one of several tiers based on ranges of actual impervious areas. Under either a flat rate or tiered rate scenario for SFR properties, the fee is effectively capped at a pre-determined level in recognition of the typical costs to serve SFR customers. Non-SFR properties are billed based on their total levels of impervious area, using the average or median level of impervious area for SFR as the equivalent billing unit. A potentially important implication of having one classification of utility customer in Chapel Hill is that the future fee crediting program and policy may be applicable, in principle, to both SFR and non-SFR properties. Administratively, however, it is often difficult for a municipality to permit and manage fee credits for individual SFR properties.

What are the current fee rates in Chapel Hill and how are properties billed?

For both residential and non-residential properties in Chapel Hill, the 2007 stormwater utility fee is **$39.00 per year (or $3.25 per month) for every 2,000 square feet of impervious area or portion thereof**. (The Equivalent Rate Unit, ERU, in Chapel Hill is 2,000 square feet.) However, the average SFR property in Chapel Hill contains more than 2,000 square feet of impervious area, which translates into a typical annual cost of $78 (or $6.50 per month) for the SFR property owner.

Property owners in Chapel Hill receive stormwater utility bills as part of their annual property tax bill from Orange County. A separate bill prepared by a third party contractor is mailed for Chapel Hill property owners in Durham County. While the Town's Stormwater Management Program operates on a fiscal year that begins on July 1st and ends June 30th of the following year, annual stormwater utility bills cover the calendar year from January 1st to December 31st.

Town Stormwater Staff manages annual updates to the utility billing database with support from the Finance Department. Updating the impervious surfaces database requires updated parcel and tax data from both Orange and Durham Counties.[3] Impervious areas for residential properties are captured from "as-built" drawings required by the Town for issuance of certificates of occupancy and linked to the parcel database. A routine process for capturing updates to commercial properties has not yet been established. The Town does not currently require "as-built" information for commercial properties. Updates to the stormwater utility billing database completed by July 1st of each year are available for tax bills issued in August.

Figure 9 provides results of a Triangle J Council of Governments (TJCOG) 2006 survey of average stormwater utility fee rates in North Carolina for detached SFR property owners.

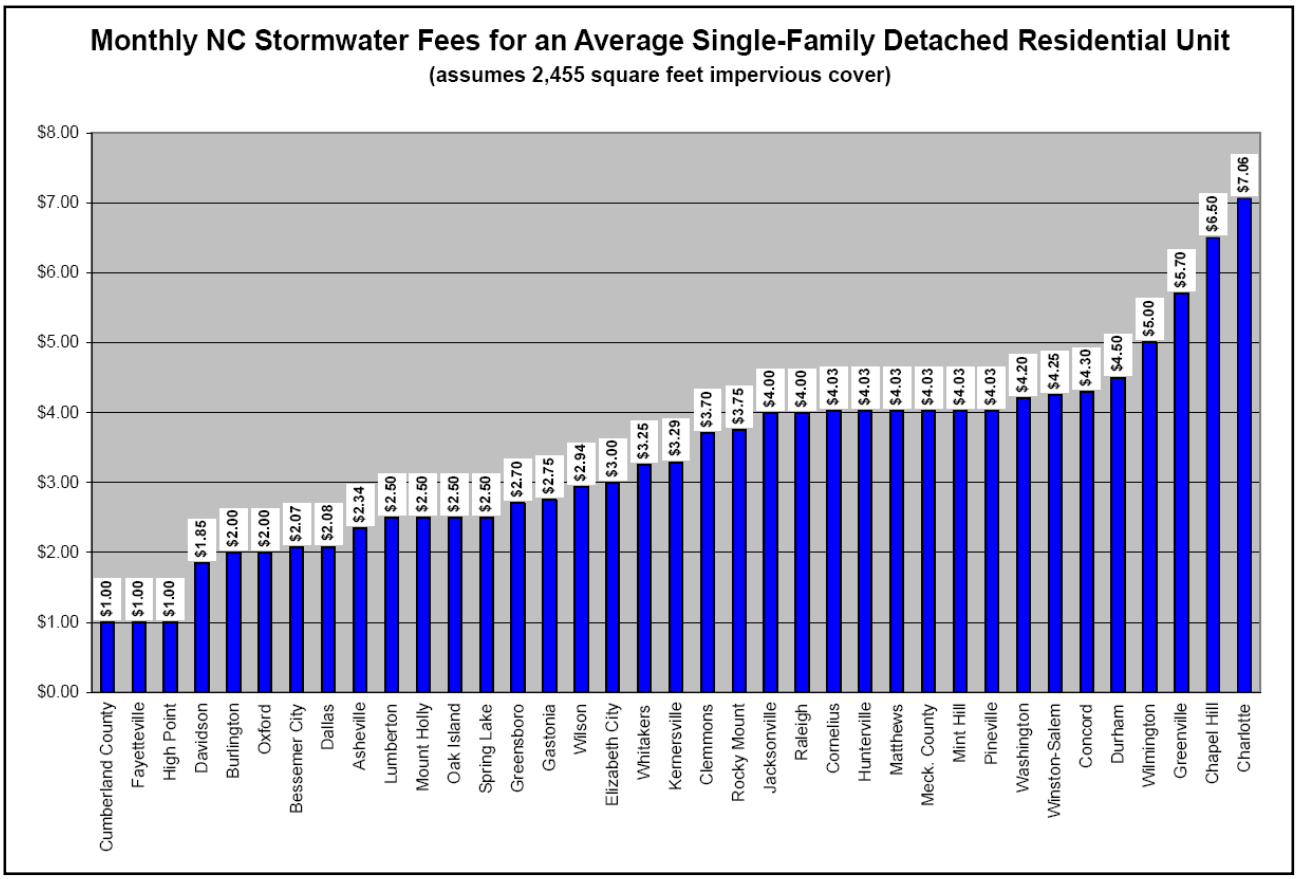


Figure 9 – Average Stormwater Fee Rates in North Carolina for SFR Properties (Source: TJCOG Survey of NC Stormwater Fees, November 2006)

[3] The Town of Chapel Hill pays approximately 2.6% of total annual utility revenue (~ $43,000 per year) to Orange and Durham Counties in addition to a third party contractor for stormwater utility billing.

At an average monthly fee of $6.50, Chapel Hill SFR property owners currently pay the second highest stormwater fee in North Carolina, behind SFR property owners in Charlotte, respectively. According to studies performed to establish the stormwater utility, there are also more than 1,000 SFR properties in Chapel Hill that have greater than 6,000 square feet of impervious area with corresponding monthly stormwater fees of $13 or higher, representing the highest SFR rates in North Carolina.

Are any properties exempt from paying the stormwater utility fee in Chapel Hill?

Like most other stormwater utilities, any public or private property within Chapel Hill's town limits (not including un-annexed areas within the Urban Services Boundary) that has impervious area is subject to the municipal stormwater utility fee. Tax-exempt properties are not exempt from the stormwater fee. State and local streets are exempt from the Town's stormwater fee, however, as are railroad rights-of-way. Minor accumulative impervious areas of less than 200 square feet are not charged a stormwater fee.

A major stakeholder in the Town's stormwater program with a number of progressive stormwater management initiatives underway, UNC is not currently a rate-paying customer to Chapel Hill's stormwater utility. UNC property represents about 14% of the Town of Chapel Hill. Across the state, other colleges and universities in the UNC system (i.e., North Carolina State University, UNC-Charlotte, UNC-Greensboro, UNC-Wilmington, etc.) participate in municipal stormwater fees.

Further recommendations' regarding the strategic importance of continued and expanded stormwater program collaboration between UNC and the Town of Chapel Hill is provided in Section 4 of this report. It will be important to recognize and quantify UNC's stormwater management programs and practices through a future fee crediting system for the Town's stormwater utility. For example, North Carolina State University receives a 50% credit towards its stormwater utility fees to the City of Raleigh through implementation of its NPDES stormwater permit and program along with structural stormwater management practices on campus.

What is the total revenue collected from stormwater utility fees in Chapel Hill?

Summarized in detail earlier, the total revenue from stormwater fees is projected at $1,660,000 for FY 2007-2008. This corresponds to about 42,564 billing units at $39 per year. Chapel Hill has received about 96.5% of its total revenue due based on several years of billing and collection experience. A detailed analysis of the utility customer billing database and corresponding fee rates is planned for Phase 2 of the master plan, particularly linked to needed and desired future program levels of service.

Stormwater Management Utility Advisory Board

As evidenced by many participants in stormwater-related studies over the decade prior to adoption of the stormwater utility, the Town of Chapel Hill has an outstanding tradition of citizen and community stakeholder involvement. Along with creation of the Stormwater Management Utility in 2004, Council formally established the *Stormwater Management Utility Advisory Board*. The Stormwater Advisory Board is one of nine standing Advisory Boards authorized by the Town of Chapel Hill.

There are 11 members of the Stormwater Advisory Board: 6 residential members, 4 commercial property members, and 1 UNC employee. In addition, there are two informal liaisons to the Board, 1 from OWASA and 1 from Town Council. Board members serve staggered, three-year terms and are

not eligible for more than two consecutive three-year terms. In 2006 the Board established several committees that will focus on the technical and educational components of the stormwater management program.

The duties of the Advisory Board span the complete realm of the Town's Stormwater Management Program, including the following activities:

(1) Provide recommendations regarding the identification and implementation of new stormwater management program activities.

(2) Review and provide recommendations on the stormwater management program master plan.

(3) Provide recommendations concerning gaps or inconsistencies in town stormwater management services, facilities, programs, policies, and regulations and recommend improvement alternatives.

(4) Provide recommendations for priorities and scheduling of watershed master planning and development of drainage basin plans.

(5) Assist town staff in working with stakeholder groups to implement program objectives and activities.

(6) Assist town staff with public education and outreach activities that promote the town's stormwater management program.

(7) Assist town staff in meeting the mission and achieving the identified goals and objectives of the town's stormwater management program.

(8) Provide recommendations for internal program evaluation and reporting mechanisms, and assist town staff in periodically reporting to the town council on program effectiveness.

The Stormwater Advisory Board typically meets monthly. Building on the long and rich history of public involvement in Chapel Hill government, the dedicated and well-qualified Advisory Board members are providing a high level of service to the community. Member contact information and meeting agendas are regularly posted on the Town's website. The Board also welcomes input from interested citizens and guests at the beginning of each meeting.

Citizen involvement and participation are indeed critical to the success of local stormwater management programs. Stakeholder input and feedback is particularly important for aspects of stormwater programs and services where regulatory standards do not apply or are not fully defined, as in the Maximum Extent Practicable (MEP) standard in current NPDES stormwater quality regulations. In such cases, the EOS and LOS for municipal stormwater programs and services are directly related to the needs and desires of the community, as evidenced by local willingness to pay for programs and services.

Available Water Quality, Drainage, and Flood Hazard Data Summary

As part of building the foundation for the program master plan, the first phase project included a review of the available quantitative stormwater management data collected from relevant outside sources and by the Town of Chapel Hill. Major water quality impairments and regulated flood hazard areas are readily identified in the existing data. In addition, a number of drainage problem areas and concerns have been identified by staff through responding to citizen requests for assistance over the past several years. Importantly, much of the data is in Geographic Information System (GIS) format which integrates both spatial and attribute information. The Town utilizes the industry-leading ESRI ArcGIS® platform and software.

A detailed inventory of stormwater management-related data is documented in Appendix 2.

The currently available data is divided into the following nine general categories:

1) Aerials & Planimetrics,

2) Elevation/Topography,

3) Hydrology,

4) Infrastructure,

5) Land Use,

6) Flood Hazard Zones,

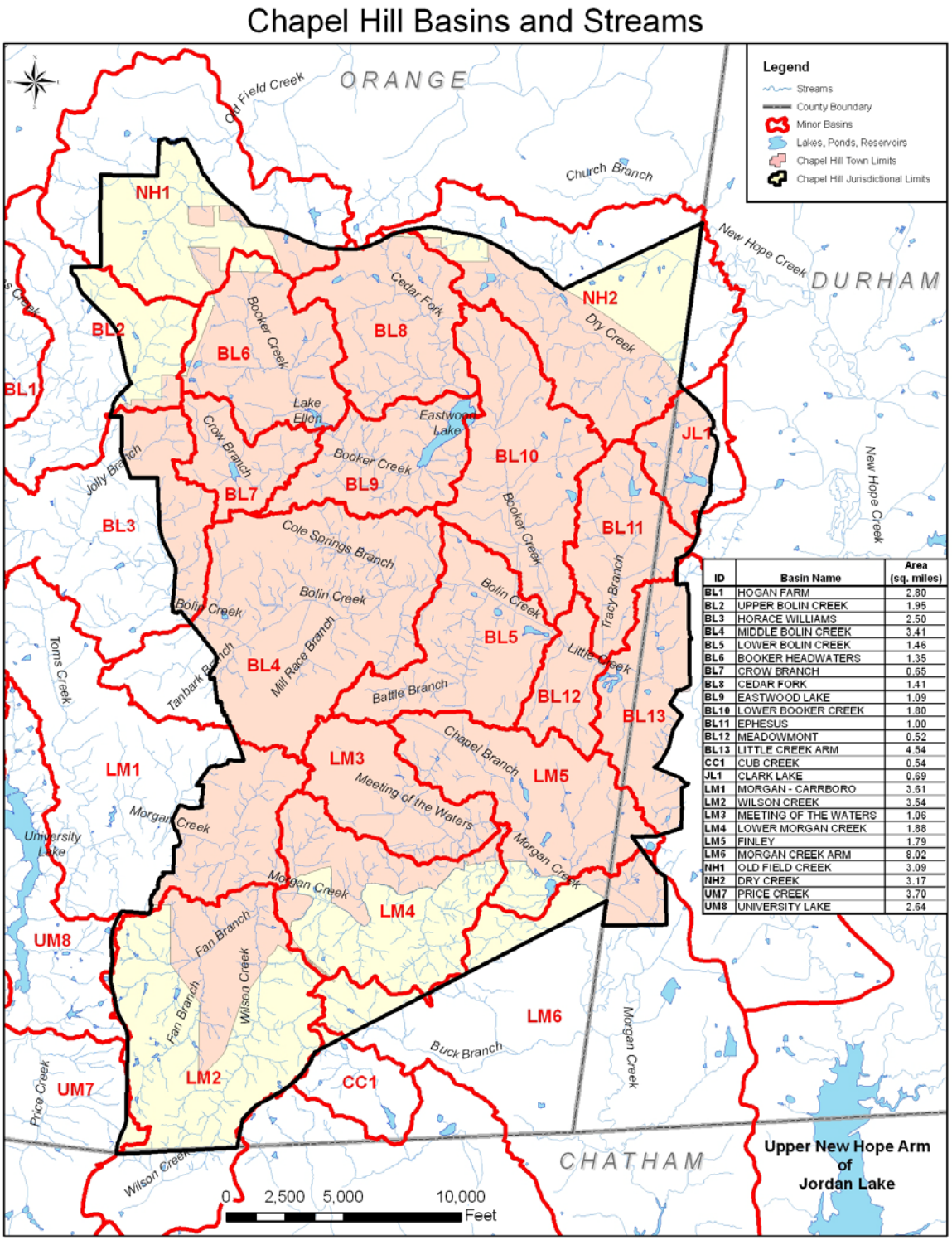
7) Soils,

8) Transportation, and

9) Water Quality.

Sources for the data include the Town of Chapel Hill Engineering and Planning Departments, OWASA GIS, Orange County GIS, Durham City GIS, NC Ecosystem Enhancement Program (EEP), United States Geological Survey (USGS), NCDOT, North Carolina Floodplain Mapping Program, US Department of Agriculture – Natural Resources Conservation Service (NRCS) in addition to data maintained by the Chapel Hill Stormwater Management Division. The available data is fairly extensive with both water quantity and water quality-related issues included.

Figure 10 is a map of Chapel Hill's streams and a delineation of local watersheds and sub-watersheds. Chapel Hill's jurisdiction has been subdivided into 22 sub-watersheds. The second phase of the master plan will include a pilot sub-watershed study on one or more of the Town's sub-watersheds. The three major streams flowing through Chapel Hill are Booker, Bolin, and Morgan Creeks, all of which are included on the state's 303(d) listing of impaired surface waters. Required by the federal Clean Water Act (CWA), the 303(d) list developed and maintained by the NC Division of Water Quality (DWQ) shows waters which are not meeting their intended uses or which have impaired uses.



ID	Basin Name	Area (sq. miles)
BL1	HOGAN FARM	2.80
BL2	UPPER BOLIN CREEK	1.95
BL3	HORACE WILLIAMS	2.50
BL4	MIDDLE BOLIN CREEK	3.41
BL5	LOWER BOLIN CREEK	1.46
BL6	BOOKER HEADWATERS	1.35
BL7	CROW BRANCH	0.65
BL8	CEDAR FORK	1.41
BL9	EASTWOOD LAKE	1.09
BL10	LOWER BOOKER CREEK	1.80
BL11	EPHESUS	1.00
BL12	MEADOWMONT	0.52
BL13	LITTLE CREEK ARM	4.54
CC1	CUB CREEK	0.54
JL1	CLARK LAKE	0.69
LM1	MORGAN - CARRBORO	3.61
LM2	WILSON CREEK	3.54
LM3	MEETING OF THE WATERS	1.06
LM4	LOWER MORGAN CREEK	1.88
LM5	FINLEY	1.79
LM6	MORGAN CREEK ARM	8.02
NH1	OLD FIELD CREEK	3.09
NH2	DRY CREEK	3.17
UM7	PRICE CREEK	3.70
UM8	UNIVERSITY LAKE	2.64

Figure 10 – Watersheds and Sub-Watersheds within Chapel Hill (Source: Town, 2006)

Table 6 is an excerpt from the NC DWQ 2006 Integrated 305(b) and 303(d) Report listing impaired waters within Chapel Hill's jurisdiction. Except for the Morgan Creek Arm of the New Hope River Arm of Jordan Lake, streams in the Chapel Hill region are listed as impaired for aquatic life due to biological integrity (Category 6).

A higher priority Category 5 listing, the Upper New Hope Arm of Jordan Lake will subject Chapel Hill to the forthcoming Total Maximum Daily Load (TMDL) program for nutrient controls. All of the stream uses within Chapel Hill and the surrounding region are classified as C, Nutrient Sensitive Waters (NSW), and/or Water-Supply (WS).

Figure 11 shows both NC DWQ and Town of Chapel Hill water quality sampling sites along with the impaired stream segments. The Town has established monthly testing at 13 ambient water quality sampling sites (11 in Chapel Hill and 2 in Carrboro). These monitoring sites are primarily located on the three major streams (Booker, Bolin, and Morgan Creeks). The USGS has two real-time streamflow gages on Morgan Creek, one to the west of Chapel Hill and another near the southern limits of town.

Table 6 – 303(d) Listed Streams in Chapel Hill (Source: NC DWQ, 2006)

CAPE FEAR River Basin								Subbasin 03-06-06
Waterbody and Description	*Assessment Unit (AU)*	*Class*	*Subbasin*	*Impaired Use*	*Year Listed*	*Category and Reason for Listing*	*Potential Source(s)*	*Miles or Acres*
CAPE FEAR River Basin								**Subbasin 03-06-06**
Bolin Creek (Hogan Lake)	**16-41-1-15-1-(0.5)b**	**C NSW**	**03-06-06**			**6**		**3.1 FW Miles**
From Pathway Drive to US Hwy 501 Business				AL	2006	6 Impaired biological integrity		
Booker Creek	**16-41-1-15-2-(4)**	**C NSW**	**03-06-06**			**6**		**1.2 FW Miles**
From dam at eastwood Lake to US Hwy 15				AL	2000	6 Impaired biological integrity		
Booker Creek	**16-41-1-15-2-(5)**	**WS-IV NSW**	**03-06-06**			**6**		**0.9 FW Miles**
From US Hwy 15 to Little Creek				AL	2000	6 Impaired biological integrity		
Booker Creek (East-wood Lake)	**16-41-1-15-2-(1)**	**B NSW**	**03-06-06**			**6**		**3.5 FW Miles**
From source to dam at Eastwood Lake				AL	2000	6 Impaired biological integrity		
Little Creek	**16-41-1-15-(0.5)**	**WS-IV NSW**	**03-06-06**			**6**		**4.9 FW Miles**
From source to a point 0.7 mile downstream of Durham County SR 1110				AL	2000	6 Impaired biological integrity		
Little Creek	**16-41-1-15-(3)**	**WS-IV NSW CA**	**03-06-06**			**6**		**0.8 FW Miles**
From a point 0.76 mile downstream of Durham County SR 1110 to New Hope Creek				AL	2000	6 Impaired biological integrity		
Meeting of the Waters	**16-41-2-7**	**WS-IV NSW**	**03-06-06**			**6**		**1.5 FW Miles**
From source to Morgan Creek				AL	2000	6 Impaired biological integrity		
Morgan Creek	**16-41-2-(5.5)b**	**WS-IV NSW**	**03-06-06**			**6**		**4.1 FW Miles**
From Meeting of the Waters to Chatham County SR 1726 (Durham County SR 1109)				AL	2000	6 Impaired biological integrity	MS4 NPDES	

CAPE FEAR River Basin								Subbasin 03-06-06
Waterbody and Description	*Assessment Unit (AU)*	*Class*	*Subbasin*	*Impaired Use*	*Year Listed*	*Category and Reason for Listing*	*Potential Source(s)*	*Miles or Acres*
Morgan Creek (including the Morgan Creek Arm of New Hope River Arm of B. Everett Jordan Lake)	**16-41-2-(9.5)**	**WS-IV NSW CA**	**03-06-06**			**5**		**836.2 FW Acres**
From Chatham County SR 1726 (Durham County SR 1109) to New Hope Creek Arm of New Hope River Arm of B. Everett Jordan Lake				AL	2002	5 Standard violation: Chlorophyll a	MS4 NPDES WWTP NPDES	

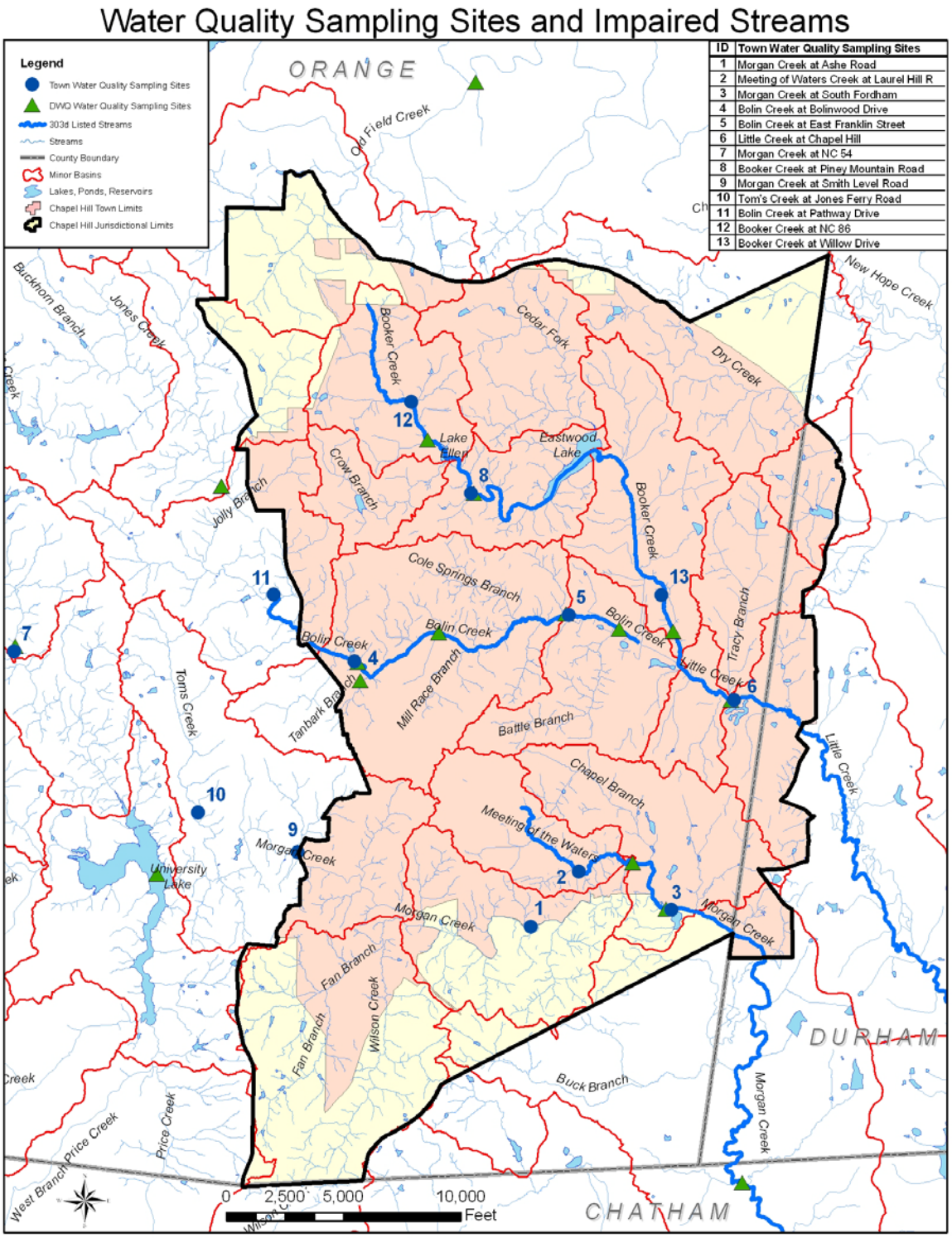


Figure 11 – Water Quality Sampling Sites and Impaired Streams (Source: Town, 2006)

Figure 12 is a map of Chapel Hill's regulated flood hazard areas as determined by the NC Floodplain Mapping Program for the National Flood Insurance Program (NFIP) as part of the recently effective Cape Fear River Basin Study. The new floodplain maps became effective for Chapel Hill in February 2007.

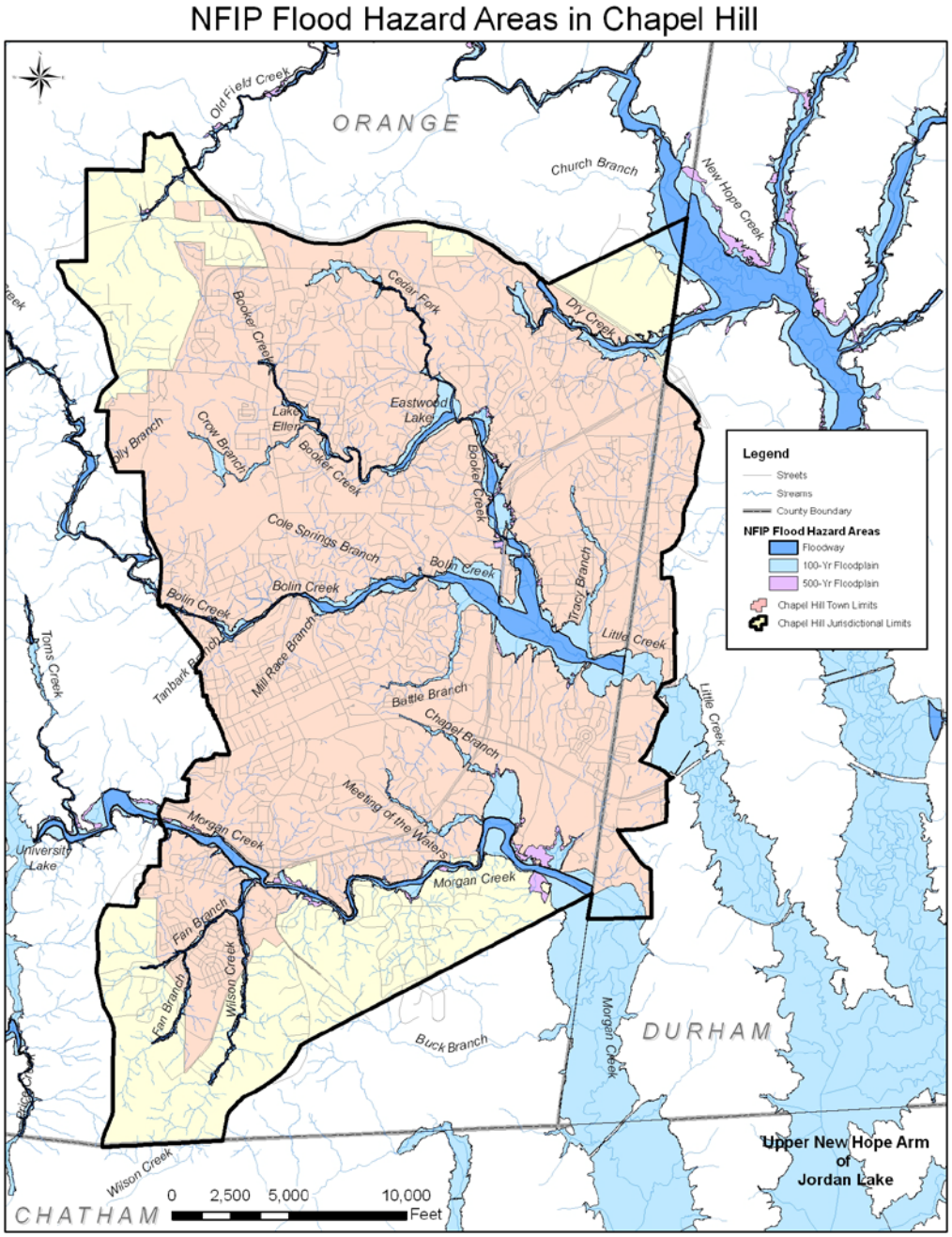


Figure 12 – Regulated Flood Hazard Areas in Chapel Hill (Source: NCFPM, 2006/2007)

In addition to their listing as impaired streams, Booker, Bolin and Morgan Creeks are readily seen as major sources of flooding. Beginning the long-term process of flood hazard mitigation, the Town has

received a FEMA Hazard Mitigation Grant of $2.2 million to potentially acquire and demolish part of the highly flood prone Camelot Village multi-family residential property along Bolin Creek. This project is currently underway. The Town has identified more than $140 million of flood prone structures along the Bolin Creek corridor.

The Chapel Hill Stormwater Management staff collects various types of data in support of its local program including satisfying requirements of the NPDES Phase II permit. For example, Stormwater staff has been in the process of classifying streams (i.e., intermittent and perennial) and building a GIS layer used to develop stream buffers which then becomes a part of the local Resource Conservation District (RCD) mapping.

Over the past several years, the Town has utilized summer help and its part-time stormwater intern to collect stormwater infrastructure data including storm sewer inlets and lines, as well as major outfalls. The MS4 outfall inventory is a required component of Phase II. GIS layers of the system inventory data are being developed with extensive work yet required to complete, review, and apply this effort. For example, pipe connections within the system have been assumed.

The Town had collected locations of 9,600 stormwater structures as of June 2006. Chapel Hill has over 13,500 acres within its town limits and about 17,600 acres within its Urban Services Boundary. Based on experiences with stormwater system inventory projects in other Piedmont North Carolina cities, there may be approximately 1 to 1 ½ stormwater structures per acre within urban areas like Chapel Hill. It is estimated that approximately 13,500 to 20,200 stormwater structures may exist within the current Town limits. Therefore, about 47 - 71% of the Town's stormwater infrastructure may have been located. The attribute data associated with the structures is also incomplete requiring additional quality control review in order to be useful for subsequent watershed master planning and drainage system modeling, illicit discharge tracking, asset management, and other program purposes. Reviewing the work to date while completing a sound MS4 inventory will be an important early component of implementing the program master plan.

Stormwater also keeps a database of reported drainage problems – see Figure 13. Information relative to the reported drainage problems is collected and documented by the Stormwater staff in the form of drainage reports including maps and photos. These drainage reports are then utilized in the implementation of the Town's Drainage Assistance Program. The Town has made special notice of those sites that have had repetitive drainage problems.

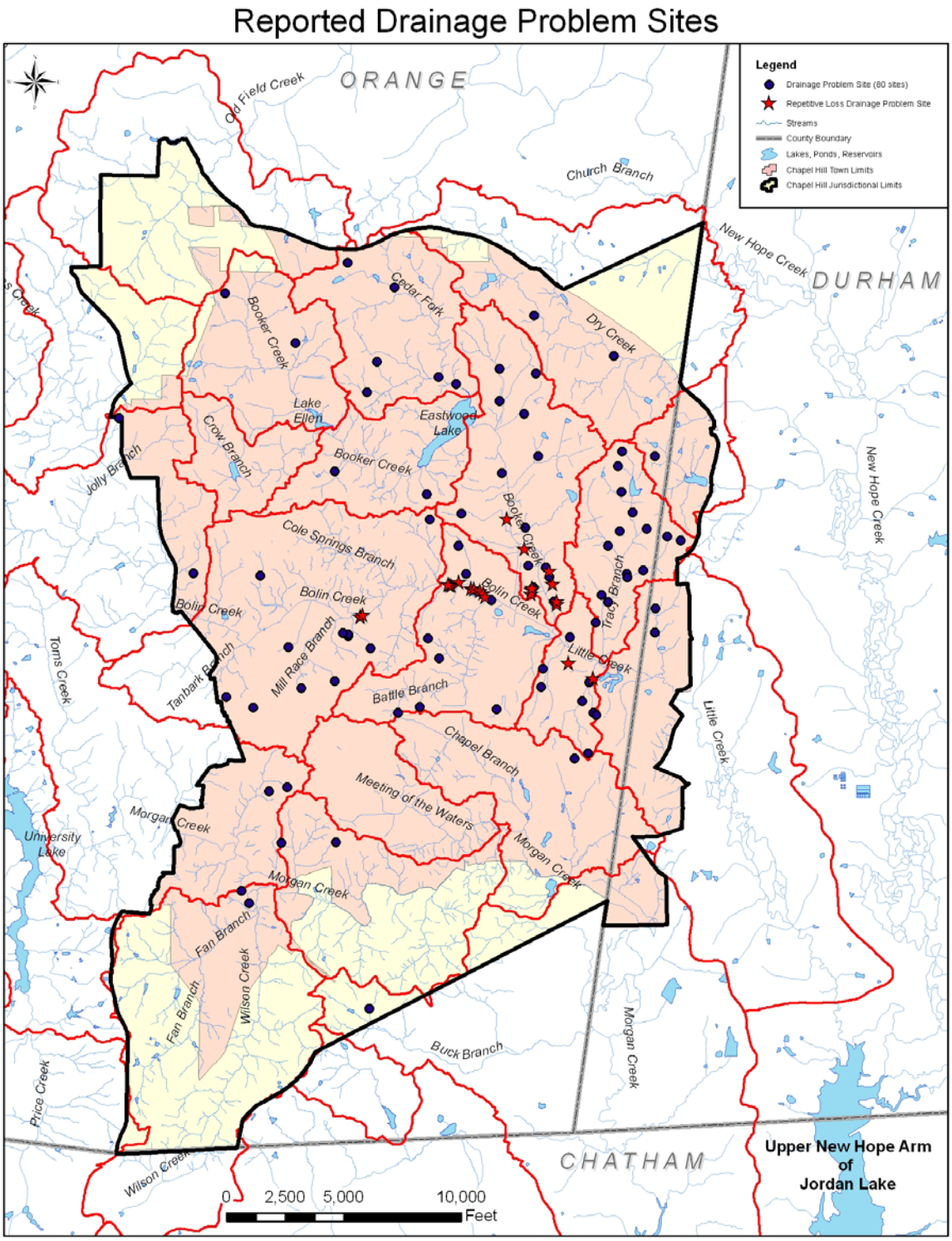


Figure 13 – Reported Drainage Problem Sites in Chapel Hill (Source: Town, 2006)

Stormwater Capital Improvement and Drainage Assistance Programs

The Capital Improvement Program (CIP) and Drainage Assistance Program (DAP) are two of the most important and highly visible stormwater services offered by the Town of Chapel Hill. The CIP is designed for improvements and upgrades to major components of the public drainage system, such as replacing undersized or deteriorated culverts under local streets or priority stream stabilization and restoration projects. The DAP was established several years ago by the Town to provide limited technical and financial assistance to residential property owners with drainage problems.

Prior to establishment of the stormwater utility the Town did not generally have dedicated funding for stormwater-related CIPs. Even today with the utility in place the level of funding for the stormwater CIP is relatively low. In FY 06/07, $150,000 was available to fund both the CIP and DAP, for example. While proposed funding in FY 07/08 is higher due to budget re-appropriations for several pending projects, an important theme for the program is to further define the resources and tools needed to implement the CIP and DAP.

Table 7 shows the Town's current stormwater CIP plan.

Table 7 – Stormwater CIP Plan (Source: Town Budget Documents, 2007)

Reference #	Council Priority	Project	2006-07 Budget	Estimated Reapprop. to 2007-08	2007-08 Budget	2008-09	2009-10	2010-11	2011-12	2012-13
	Infrastructure									
98	2	Burning Tree Drive Culvert Replacement			295,000					
99	4	North Street Inlet and Culvert Replacement			-					
100	4	Upgrade Booker Creek Road Double Corrugated Metal Pipes	20,000	20,000	-					
101	4	Willow Drive/Estes Drive Drainage Improvements	30,000	30,000	-					
102	4	Rosemary Street Junction Box and Network Replacement	20,000	20,000	-					
103	4	Capital Improvement Program (CIP) Project Design			70,000	100,000	100,000	100,000	100,000	100,000
104	4	Capital Improvement Program (CIP) Project Construction			100,000	100,000	100,000	100,000	300,000	500,000
105	4	Curb and Gutter Replacement Project	30,000		30,000	30,000	30,000	30,000	30,000	30,000
		TOTAL	100,000	70,000	495,000	230,000	230,000	230,000	430,000	630,000

COLUMN DESCRIPTION KEY

Council Priority
1 - Council Authorized Contracts
2 - Projects that have a Council mandate
3 - Projects that we have a legal requirement to perform or complete
4 - Projects that would repair or maintain existing Town facilities/infrastructure above and beyond ordinary maintenance
5 - Projects involving public safety
6 - Projects which are part of an adopted master plan
7 - Other projects

Considering the significant time and expense of designing, permitting, and constructing stormwater improvement projects, utility resources currently allocated to the CIP and DAP are only adequate to provide a minimal level of service for the Chapel Hill community.[4] Forthcoming Jordan Lake nutrient control requirements to identify BMP retrofits for existing developments will also add significantly to the level of resources required for the stormwater CIP. An analysis of the potential financial impacts to Chapel Hill's stormwater utility from the Jordan Lake rule may be included within the second phase of the master plan project.

Development of a draft **stormwater CIP prioritization rating system** was a component of the first phase project. While a basic methodology was in place for the DAP, the Town, like many new stormwater utilities, did not have a formal project prioritization model or system for the stormwater CIP. A CIP prioritization system is important for any municipal stormwater program, regardless of the amount of funding dedicated for its capital improvement program. The goal of a CIP rating model is to objectively determine which projects are most important to implement given limited available public resources. The CIP rating system should be consistent with and advance Town of Chapel Hill goals, both comprehensive planning goals and stormwater management goals. The CIP rating system should be technically robust while also easily understandable to officials and lay citizens alike.

The preliminary stormwater CIP prioritization rating system is provided in Appendix 3. The draft model takes into account 15 criteria (such as public safety and public health, property damage, regulatory mandates, water quality benefits, permitting requirements, mitigation requirements, impact of project, cost of project, etc.) and will allow Town staff and officials to place relative weights on the various criteria. Further, the Town will also develop and maintain flexibility in defining specific ratings for each of the criteria. Importantly, once the relative weights and rating factors are established they will be applied consistently from project to project. Should controlling regulations or other environmental factors change over time, however, the model framework is flexible to be adapted to new or changing conditions. This approach is also consistent with the strategy inherent in developing the stormwater program master plan.

The second phase project will finalize the draft CIP rating model in addition to refining the current DAP rating approach for consistency with the final CIP rating system.

[4] For an example to illustrate the cost of major stormwater improvement projects, $150,000 may be sufficient to analyze, design, permit, and construct a single urban stream restoration project of around 500 linear feet.

State and Federal Stormwater Regulatory Requirements

"EPA strongly encourages partnerships and the watershed approach as the management framework for efficiently, effectively, and consistently protecting and restoring aquatic ecosystems and protecting public health." - *US EPA, December 1999*

The two watershed-based regulatory requirements impacting Chapel Hill are the current water-supply watershed protection rule (in place since the early 1990's) and the upcoming Jordan Lake nutrient control program (anticipated to become effective in summer 2009). Other existing state and federal stormwater-related regulations, in general, are jurisdictional and/or project based and not a function of or related to watershed boundaries. Understanding the importance of watershed-based strategies, Chapel Hill recognizes the need to involve and collaborate with both local and regional stakeholders in efforts to protect and improve water quality. Section 3 describes the significant stakeholder component to stormwater program master planning efforts in Chapel Hill.

Table 8 provides a concise listing of key state and federal stormwater-related regulations and requirements affecting or relating to the mission of Chapel Hill's stormwater program. Meeting or exceeding state and federal mandates regarding stormwater management is one of the important goals for the Town's stormwater program.

Table 8 – Key Stormwater-Related Regulatory Programs Impacting Chapel Hill

State/Federal Regulatory Program	Lead Regulatory Agency	Program Focus
NPDES Phase II Stormwater	EPA/NC DWQ	Control pollutant discharges from MS4 to Maximum Extent Practicable (MEP) through six minimum stormwater control measures/programs
Water-Supply Watershed Protection	NC DWQ	Development density limitations, stream buffers, and structural stormwater controls for state-designated water-supply watersheds
National Flood Insurance Program (NFIP)	State of NC Floodplain Management Program & FEMA	Minimize flood hazards by regulating floodways and floodplains for major streams (i.e., Booker, Bolin, and Morgan)
NC Dam Safety Program	NC DENR/Land Quality	Regulate safety of dams for low, intermediate, and high hazard water impoundments; maintain low flows
Section 404 & 401 of federal Clean Water Act	404: US Army Corps of Engineers 401: NC DWQ	Minimize and mitigate impacts to wetlands and other surface waters of the state
NC Erosion & Sediment Control Program	NC DENR/Land Quality *(Orange County is the delegated local E&SC program)*	Control erosion & sedimentation from land disturbances 1 ac or greater *(Permit for 20,000 sq ft or greater in Orange County and Chapel Hill)*

Table 8 – Key Stormwater-Related Regulatory Programs Impacting Chapel Hill (continued)

State/Federal Regulatory Program	Lead Agency	Program Focus
National Environmental Policy Act (NEPA)	Council on Environmental Quality (CEQ)	Environmental assessment/impact statement - any project with federal funding, control, or permits may be covered under NEPA
State Environmental Policy Act (SEPA)	State Clearinghouse in NC Dept. of Administration	Environmental assessment/impact statement - State permit or funding may require SEPA for local projects
Jordan Lake Nutrient Management Strategy (Draft rules currently available, public hearings in process, final rule anticipated effective in summer 2009)	NC DWQ	Reduce nutrients (nitrogen and phosphorus) entering Jordan Lake through point and non-point source TMDL to meet water quality standards, BMPs for new development, Unprecedented feasibility studies and BMPs required for existing development by local governments including Chapel Hill

The existing water supply watershed protection, NPDES Phase II stormwater permit (NCS000414), and forthcoming Jordan Lake nutrient control rules are the most significant state and federal stormwater regulations currently affecting the Town of Chapel Hill. In fact, the Jordan Lake rule will represent the most stringent set of state requirements in North Carolina to date for stormwater management controls. Table 9 provides a summary of the Town's NPDES Phase II program requirements along with initial master planning recommendations for further program development and implementation.

Table 9 – Recommendations for Implementation of NPDES Phase II Programs

NPDES Phase II Program	Master Plan Recommendation(s)
Develop public education, outreach, and public involvement programs *(Significant collaborative opportunity with UNC-Chapel Hill)*	Public education, outreach, and public involvement are integral components to Chapel Hill's NPDES Phase II permit. **Recommend further development of a coordinated and integrated public education, outreach, and involvement program** to cover several areas within the permit including Part II, Section B: Public Education and Outreach, Section C: Public Involvement and Participation, Section D: Illicit Discharge Detection and Elimination, Section E: Construction Site Runoff Controls, Section F: Post-Construction Site Runoff Controls, and Section G: Pollution Prevention and Good Housekeeping for Municipal Operations. BMPs such as the informational web site, public education materials, volunteer programs, etc. would all be defined and coordinated under an integrated public education, outreach, and involvement program. Collaborate with UNC-Chapel Hill to extent practicable. **Stormwater Advisory Committee already formed and their work is well underway.**
Develop Illicit Discharge Detection and Elimination Program	**Develop and implement technical procedures** to detect, track, and eliminate illicit discharges **(Program Standard Operating Procedure). Scheduled for FY 07/08.** Establish **local ordinance** to implement and enforce the illicit discharge detection and elimination program. **Implement and update the program over time.**

Table 9 – Recommendations for Implementation of NPDES Phase II Programs (continued)

NPDES Phase II Program	Master Plan Recommendation(s)
Develop the MS4 Inventory (Storm Sewer System Base Map)	**Continue to build the Town's MS4 database and inventory of stormwater features. Field survey to complete inventory over next several years, using in-house resources and/or contracted inventory survey crews (dependant upon available funding). System mapping also a component of the upcoming Jordan Lake rule.** Sound system inventory will also be foundational for watershed-based master plans.
Conduct employee cross-training	Develop **Town employee training programs** on NPDES Ph II stormwater requirements, **stormwater pollution prevention**, and good housekeeping for **Town operations**. **Perform training, provide regular refresher courses, and training for new employees.** **Integrated employee training programs** can cover several areas of the NPDES program including Part II, Section D, Section E, Section F, and Section G
Construction Site Runoff Control Program *(Program delegated to Orange County through inter-local agreement)*	Erosion and sediment control (E&SC) during construction and land disturbances. Note: Chapel Hill E&SC program administered and implemented by Orange County. E&SC is not supported by Town stormwater utility fees. **Consider expanded financial resources to support higher level of E&SC program from County and/or supplement with Town of Chapel Hill staff and resources.** **Consider reducing threshold for required E&SC permit to 5,000 sq ft of land disturbance for consistency with LUMO/Stormwater Management requirements.**
Establish a Post-Construction Stormwater Management Program *(Collaborative opportunity with UNC-Chapel Hill)*	**Post-construction stormwater management requirements through Town LUMO** **Ensure long-term operation and maintenance of structural BMPs through LUMO** **Develop a certified BMP inspector program and require annual reports from owners to be filed with Town (currently only required for watershed protection areas)** **Town Stormwater staff perform random periodic inspections of BMPs to ensure quality of certified BMP inspection reports (current reactive program only)** **Continue to work with UNC-Chapel Hill for post-construction stormwater management requirements for campus developments (i.e., OI-4) including Carolina North.**
Establish program to control sources of fecal coliform	**Develop collaborative septic inspection program with Orange County Health Department; integrate with public education programs; review database of septic field locations from Orange County; also link to upcoming Jordan Lake program.** **Develop collaborative programs with OWASA** to minimize infiltration, exfiltration, and overflows from the sanitary sewer system. Develop memorandum of understanding.
Pollution prevention and good housekeeping for municipal operations	Develop and/or update **stormwater pollution prevention plans and integrated spill control and countermeasure plans** for Town-operated and maintained facilities Conduct initial and ongoing **staff training**, per above **Perform and document annual inspections of Town-operated facilities**
Annual Reporting	**Develop regular format and maintain databases for annual NPDES program reporting** to NC DWQ **Prepare annual reports and submit to NC DWQ by August 31st of each permit year. (Annual reports cover the previous year's activities from July 1 to June 30.)** **Maintain archives of NPDES Phase II databases and annual reports. (The Town of Chapel Hill must maintain records for at least 5 years per state requirements. Recommend maintaining records indefinitely for comprehensive program tracking and assessment.)** **Recommend integrating NPDES Phase II annual report with future Jordan Lake rules annual report. Develop a comprehensive program annual report for multiple regulatory reporting purposes as well as official public information on program accomplishments.**

Derived from the federal Clean Water Act, the current regulatory standard for implementation of the NPDES Phase II program is the Maximum Extent Practicable (MEP). Put simply, if the Town develops and implements the BMPs described in its stormwater management program and permit then it may be deemed by the State to be in compliance, regardless of actual water quality conditions. In successive iterations of Phase II permit renewal, however, BMP requirements are expected to continue to increase until receiving water quality standards are satisfied. In addition, as TMDL water quality recovery programs are required such as exemplified by the Jordan Lake nutrient rules, specific standards for stormwater controls will increase above baseline NPDES Phase II requirements.

In a format that is easily comparable to the NPDES Phase II program information from Table 9, Table 10 contains a summary of the key requirements from the proposed Jordan Lake rules affecting Chapel Hill. Several items required under the Jordan rules are also required under the existing NPDES Phase II permit and program, so local administrative integration of the two programs will be appropriate, both in the stormwater master plan and ongoing implementation and reporting. The Jordan rules also build upon and expand the State's water supply watershed protection program. Under the proposed Jordan rules, the entire Jordan Lake watershed will be designated as a critical water supply watershed with additional, more stringent requirements. Chapel Hill is part of the Upper New Hope arm of the Jordan rule.

Table 10 – Highlights of Jordan Lake Stormwater Management Requirements

Jordan Lake Rule Component	Highlights of Jordan Rule & Master Plan Recommendation(s)
Stormwater management for new development (Post-construction stormwater management controls)	Approved stormwater management plan required for 1 acre or greater residential developments and ½ acre or more commercial developments. ***Recommend maintaining higher standard of 5,000 sq ft threshold currently in place in Chapel Hill LUMO (Land Use Management Ordinance). Continue to exceed state minimum standard for new development control(s).*** Nitrogen (N) and phosphorus (P) loads are not to exceed 2.2 lbs/ac/yr and 0.82 lbs/ac/yr, respectively (Upper New Hope control standard). Control and treat runoff generated by 1" of precipitation (similar to current water supply watershed protection standard) Control 85% TSS (Total Suspended Solids) No net increase in peak flow from developed site for the 1-year, 24-hour storm Riparian buffers (Minimum 50 ft for intermittent and perennial streams; 2-zones) ***Recommendation: Required stormwater controls are generally consistent with low impact development approaches. Integrate Jordan requirements with LID in Chapel Hill to extent practicable. Build upon existing Town LUMO requirements for stormwater control. Provide credits to landowners who can exceed minimum nutrient control requirements. As watershed studies are performed identify potential off-site opportunities for nutrient control where Town may implement BMPs and offer option for developers and re-developers to buy N + P credits, where in the best interest of receiving waters and the public.***

Table 10 – Highlights of Jordan Lake Stormwater Management Requirements (continued)

Jordan Lake Rule Component	Highlights of Jordan Rule & Master Plan Recommendation(s)
Stormwater management for existing development	Local governments must conduct feasibility studies within 3 years to propose the pace and nature of implementation of controls for existing development ***Recommend integrating Jordan nutrient control studies into local watershed and sub-watershed master planning studies. Begin with pilot study in Phase 2 master plan project.*** ***Develop options for on-site and off-site controls/retrofits, reductions in impervious areas, etc.*** ***Adjust stormwater utility fee as required to support studies and BMP implementations for existing development and/or heighten requirements for new development re-development to help offset controls required for existing development. Provide fee credits for higher levels of controls, if applicable.*** ***Evaluate effectiveness of enhanced street sweeping program(s) by Public Works, funded by stormwater utility*** ***Collaborate with Carrboro, UNC-Chapel Hill, and Orange County to extent practicable***
Public education programs	Local governments must develop public education program(s) to support rule ***Recommend combining with other public education programs required by NPDES Phase II. Collaborate with UNC-Chapel Hill to extent practicable.***
System mapping program	Local governments must identify local storm systems and receiving streams to support rule implementation ***Recommend combining with MS4 and system mapping required by NPDES Phase II***
Illicit discharge program	Local governments must develop an illicit discharge program ***Recommend combining with illicit discharge program required by NPDES Phase II. Seek to quantify illicit discharge program to obtain credit for treatment required for existing development.***
Identify funding mechanisms	Local governments must identify funding mechanism(s) to implement rule ***Recommend enhancing municipal stormwater utility fee stepwise over time to address growing requirements imposed by Jordan rules. Evaluate appropriate fee credits for N + P over-control and other incentives for local trading.*** ***Recommend seeking grants from NC Clean Water Management Trust Fund, EPA 319, and others to help with retrofit BMP implementation and related.***
Annual report	Local governments must provide an annual report to DWQ on rule implementation ***Recommend developing a comprehensive Chapel Hill stormwater program annual report to cover NPDES Phase II and Jordan Rule reporting requirements.*** ***Work with UNC-Chapel Hill and other local stakeholders to extent practicable on local program implementation.***

The potential fiscal impact of the Jordan Lake rules upon Chapel Hill's Stormwater Management Program is very significant, in particular dealing with the unprecedented requirement to control runoff from existing development. NC DWQ has estimated the total cost to affected local governments in the Jordan basin of satisfying the requirement to treat existing development as approximately $529 million over 30 years. The costs for full compliance with the Jordan rule for both point and non-point sources are estimated by the state at $905 million. The costs to local government to assess and implement stormwater management controls for existing development impose the greatest financial burden from the Jordan rules. The Jordan rule will also apply to state and federal entities including UNC and NCDOT, providing further effective opportunities for stormwater program collaboration.

While a potential cost for each local government was not provided by the state, an examination of Chapel Hill's population relative the total population for affected local governments in the Jordan basin offers a broad basis for estimating local costs. Chapel Hill's population is estimated at 52,011 and the affected Jordan basin population is estimated at 597,645. On percentage of basin population, it may be inferred that Chapel Hill's approximate share of the total cost of non-point source compliance is about 8.7% or $46 million over 30 years. Costs for point-source compliance in Chapel Hill will be borne primarily by OWASA. Clearly, the Jordan rule is a landscape defining set of stormwater regulations for Chapel Hill and the region, both in the near-term program master plan development and for years to come.

Town Stormwater Staff has developed a timeline displaying the anticipated implementation of the Jordan rule for Chapel Hill following its effective date (see Figure 14). The State is currently projecting formal adoption of the Jordan rule to become effective in summer 2009.

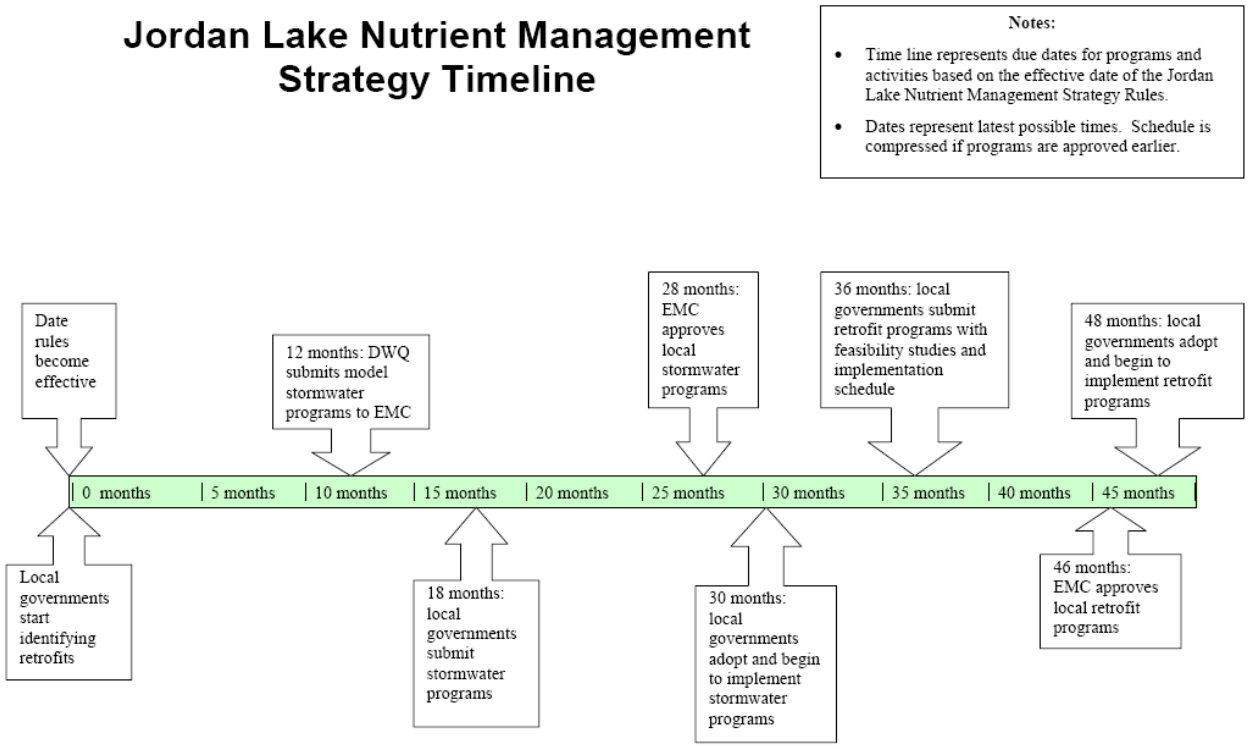


Figure 14 – Timeline for Jordan Lake Rule Implementation (Source: Town, 2007)

Local Stormwater Management Requirements

Chapel Hill's Land Use Management Ordinance (LUMO) and Resource Conservation District (RCD) along watercourses together contain among the more stringent set of local stormwater, surface water, and floodplain management requirements and guidelines currently in effect in North Carolina. Once the Jordan rule is integrated into the Town's LUMO, Chapel Hill's stormwater management standards for new development and redevelopment may represent much of the best of current known practice, especially as further Low Impact Development (LID) guidelines are encouraged or required as a means to help achieve runoff controls.

Table 11 captures the highlights of Chapel Hill's progressive local stormwater management requirements from the LUMO. Stormwater management is required for any new development or redevelopment site that must receive a Zoning Compliance Permit (ZCP), typically any land disturbance of 5,000 square feet or greater. Waivers may be granted by the Town Manager for projects that are shown not to cause any significant change in pre-application hydrology and/or for projects that have proposed alternative on-site and/or off-site stormwater control measures that satisfy local standards. Some properties may also be exempt from certain requirements.

Table 11 – Highlights of LUMO Stormwater Management Requirements

Chapel Hill LUMO Component	Highlights of Local Requirement(s) & Master Plan Recommendation(s)
Stormwater Impact Statement for new development or redevelopment projects	Stormwater management performance criteria: Control and treat the runoff from the first 1" of rainfall Control 85% TSS (Total Suspended Solids) 2-year, 24-hour post-development runoff volume must not exceed the pre-development volume of same design storm (existing conditions) Post-development peak flows for 1-year, 2-year, and 25-year storms must not exceed pre-development peak flows (existing conditions) Minimal or no disturbance to ephemeral stream channels unless authorized by ZCP ***Recommend maintaining existing baseline performance criteria and expanding to include upcoming nutrient control requirements from Jordan rule. In addition, further evaluate the specific stormwater quantity control criteria and refine/enhance as appropriate, particularly with regards to evaluation and control of downstream impacts. Consider requiring development to emulate natural conditions hydrology rather than match existing conditions. Consider greater flexibility with regards to protection of marginal ephemeral stream channels while maintaining and/or expanding protection for intermittent and perennial streams.***
Integrated management practices & stormwater design manual	Provides flexibility for integrated stormwater management controls including LID ***Recommend development of specific local LID guidelines and practices integrated within a local stormwater management analysis and design guidance manual***

Table 11 – Highlights of LUMO Stormwater Management Requirements (continued)

Chapel Hill LUMO Component	Highlights of Local Requirement(s) & Master Plan Recommendation(s)
Maintenance and inspection of stormwater controls	Controls on private property are owned and maintained by private property owner(s) Recorded easement, O&M plan, and surety for BMP(s) required Controls on public property are owned and maintained by applicable public entity ***In general, recommend maintaining current policy and procedures on stormwater controls. Should Town extend stormwater services to areas off street right of way as suggested by a broad range of stakeholders, develop specific policies and easements to address construction and maintenance of stormwater system components and controls that convey public runoff in such areas.***
Water-supply Watershed Protection District (WPD)	State required watershed protection program (New Hope Basin of Jordan Lake) Low density and high density development options with limitations on impervious area, required stormwater structural controls for high density developments, and stream buffers for perennial streams (minimum 30 ft for low density and 100 ft for high density) ***WPD requirements will be enhanced and surpassed by forthcoming Jordan Lake nutrient control program (see previous Table 10)***
Stream buffers on intermittent and perennial streams and waterbodies	Buffer for perennial streams = 150 ft (3 zones at 50 ft each) Buffer for intermittent streams = 50 ft Permitted uses in each stream zone are defined in Table 3.6.3-2 of Town LUMO ***Relatively progressive existing stream buffer rules, meeting or exceeding state-minimum rules for buffer protection in water-supply watershed protection areas as well as forthcoming Jordan Lake rules. Building upon existing good work performed by Stormwater Staff, recommend developing a Town-wide, field verified map displaying stream classifications and corresponding buffers.*** ***Sensitive areas identified through subsequent watershed studies may require enhanced buffers and/or more restrictive use definitions.***
Floodplain management for regulated special flood hazard areas (RCD Elevation)	RCD Elevation defined as 3 ft above the regulatory 100-year (1% chance) base flood elevation for special flood hazard areas defined by the State of NC Floodplain Mapping Program/ Federal Emergency Management Agency (FEMA) Lowest finished floor of permanent habitable structures must be at least 2 ft above the 1% chance base flood elevation ***As part of sub-watershed modeling and master planning, recommend evaluation of RCD elevations with respect to future/ultimate conditions base flood elevations. Current freeboard above existing conditions base flood levels may be entirely or partially adequate, but should be confirmed through detailed hydraulic floodplain modeling. Build upon updated stream models (i.e., HEC-RAS models) recently developed by the State of NC Floodplain Mapping Program to the extent possible for efficient use of limited local stormwater utility resources***.

3 - Internal and External Stakeholders

A representative set of comments received from citizens during initial master planning -

- ***"Overall Chapel Hill does well with stormwater management…"***
- ***"The stormwater management program isn't that visible and known to the general public."***
- ***"I think they are doing an excellent job of the program. We hope other areas are or will maintain the same programs."***
- ***"I wish I knew more about this (the stormwater program). I plan to visit the website."***
- ***"I remain concerned about the vulnerability of Eastgate Shopping Center and some of the surrounding areas to flooding from upstream runoff after unusually heavy rains."***
- ***"More frequent maintenance on drains and runoff areas that lead to drains."***
- ***"We should allocate more funding for stormwater management. Raise the fee and the property tax to do so if necessary."***
- ***"As a tax payer, I am very unclear about where the stormwater fee is used by the Town."***
- ***"I thank the Town stormwater management (program) for effective and efficient stormwater management services for the entire community"***
- ***"Funding should depend on whether the cause of the problem is within the control of the landowner. Also no funding to enable folks to live in the floodplain."***
- ***"We moved from northern Virginia three years ago, where this (stormwater management) was not only mandatory, but expected."***
- ***"Need more work on storm drainage."***
- ***"I have no idea what has been accomplished with my tax money."***
- ***"The drains seem to back frequently and flood into the road."***
- ***"Far more is done than the average citizen may be aware of."***
- ***We didn't know we had a stormwater program. The survey was fun to take!"***
- ***"Taking this survey makes me realize that more information would be helpful."***
- ***"I'm sure many student environmental groups on campus would be willing to help clean up (creeks). Good job overall."***
- ***"I support continued efforts to monitor and protect water quality in our community."***
- ***"Not sure what (stormwater) services are available to private homeowners."***

A significant component in the first phase journey of Chapel Hill's Stormwater Management Program Master Plan was seeking input and feedback from representative citizens as well as internal and external stakeholders. Consistent with Chapel Hill's progressive governance policy, the stormwater master plan is an open and inclusive process, with the Town desiring to understand, identify, and satisfy the needs of its local citizens and environment as well as support and enhance quality of life for the region.

As introduced in Section 2, effective stormwater management is best accomplished where regional, watershed-based strategies and practices are developed and acted upon. While it is known that cooperative and partnering efforts are helpful in stormwater management, it is rare to find voluntary collaborative programs in practice. It is believed that Chapel Hill's wide-ranging efforts to invite input to its stormwater program master plan are among the best-in-class in terms of municipal stormwater management in North Carolina. The stakeholder-integrated process is also consistent with the standard set through development of the Town's highly regarded Comprehensive Plan.

Citizen input to the first phase of stormwater master planning was primarily garnered by means of a representative survey mailed to 3,000 residences led by Town Stormwater Staff. 793 completed citizen surveys were received, an excellent 26%+ response rate which in part demonstrates the high level of care and concern that residents maintain for Chapel Hill. A remarkable finding is that citizen survey respondents collectively represent more than 9,000 years of experience living in the Chapel Hill community.

Dear Chapel Hill Resident,

Your household has been randomly selected to receive a stormwater management survey next week by mail from the Town of Chapel Hill. An option to take the survey online will also be provided. The survey should take no more than 15 minutes to complete.

Clean water, drainage and reduced flooding are important issues in our community. Your involvement will provide valuable information for stormwater management planning.

Please take a few minutes to complete and return the survey by November 20th. We look forward to hearing from you.

Sincerely,

Kevin C. Foy
Mayor

Internal stakeholders were defined as elected Town officials, Town managers, Town staff, and Advisory Boards of the Town of Chapel Hill municipal organization. Specifically, internal stakeholders included all members of the Stormwater Management Advisory Board, the Stormwater Management Staff, all members of the Town Manager's Office, all members of Town Council, 39 Town Department Heads and key Senior Staff with 460 combined years of local municipal experience, and chairs of each of the Town Advisory Boards and Commissions.

External stakeholders were defined as management/executive-level individuals leading organizations and agencies not affiliated with the Town of Chapel Hill but that may share interest in the mission and goals of the Town's Stormwater Management Program. The administrative heads of 25 external organizations were contacted to request feedback and input to Chapel Hill's stormwater master plan.

Participating external organizations included representatives from the following:

- Town of Carrboro
- Local Home Builders Association
- Orange County Erosion & Sediment Control
- Chapel Hill Downtown Partnership
- Triangle J Council of Governments (TJCOG)
- NC Division of Water Quality/Stormwater Permitting Unit
- City of Durham Storm Water Services
- Orange County Environmental Health Department
- Orange Community Housing and Land Trust
- Morgan Creek Valley Alliance
- Durham City/County Planning, and
- Orange Soil and Water Conservation District, respectively

The University provided notable input to the initial phase of the Town's stormwater master plan through their representative ongoing involvement with Chapel Hill's Stormwater Management Advisory Board. Section 4 provides recommendations regarding the strategic importance of further collaboration between the Town and the University. Enhanced stormwater program cooperation will offer tangible benefits for UNC, the Town, Chapel Hill citizens and businesses, and local streams. Continued partnership between the Town and UNC may be one of the most important components to the ultimate success of stormwater management in Chapel Hill.

Stakeholder Feedback

Each stakeholder survey questionnaire was developed with the specific *target group audience* in mind. Survey questions were intended to gauge *stakeholder group* perceptions of stormwater management and water quality related issues, to identify the relative importance of and satisfaction with various municipal stormwater programs and services, to quantify accomplishments, strengths, and challenge areas of the Town's stormwater program, to identify broad and specific local water quality, drainage, and flooding concerns, and to seek input on potential stormwater programs and services going forward, for just a few examples.

In general, the closer the stakeholder group was to the Town's Stormwater Management Program the more detailed questions that group received. For example, the Stormwater Management Staff and Stormwater Advisory Board received the most technically advanced and comprehensive survey questionnaires. Citizen and external stakeholders, on the other hand, received less technical and more qualitative-based survey questionnaires. The feedback and input will help Managers, Staff, and the

Stormwater Advisory Board craft the Program Master Plan by better understanding the real and perceived value of local municipal stormwater services, understanding the desired extent and level of stormwater services, quantifying and qualifying relative awareness levels of rate-paying customers along with various internal and external stakeholder groups, and identifying specific ways to collaborate while continuing to improve stormwater utility program service delivery.

Chapel Hill staff leading or involved with the Town's Stormwater Management Program were also interviewed during the first phase of master planning. Insights gleaned from personnel interviews are integrated into the summary and assessment of the existing stormwater program highlighted in Section 2 and support recommendations for the second and subsequent phases of master plan development and implementation in Section 4.

Appendix 4 and Appendix 5 contain the master matrix of stakeholder survey questions along with detailed complete results from each of the eight *targeted group surveys*, respectively:

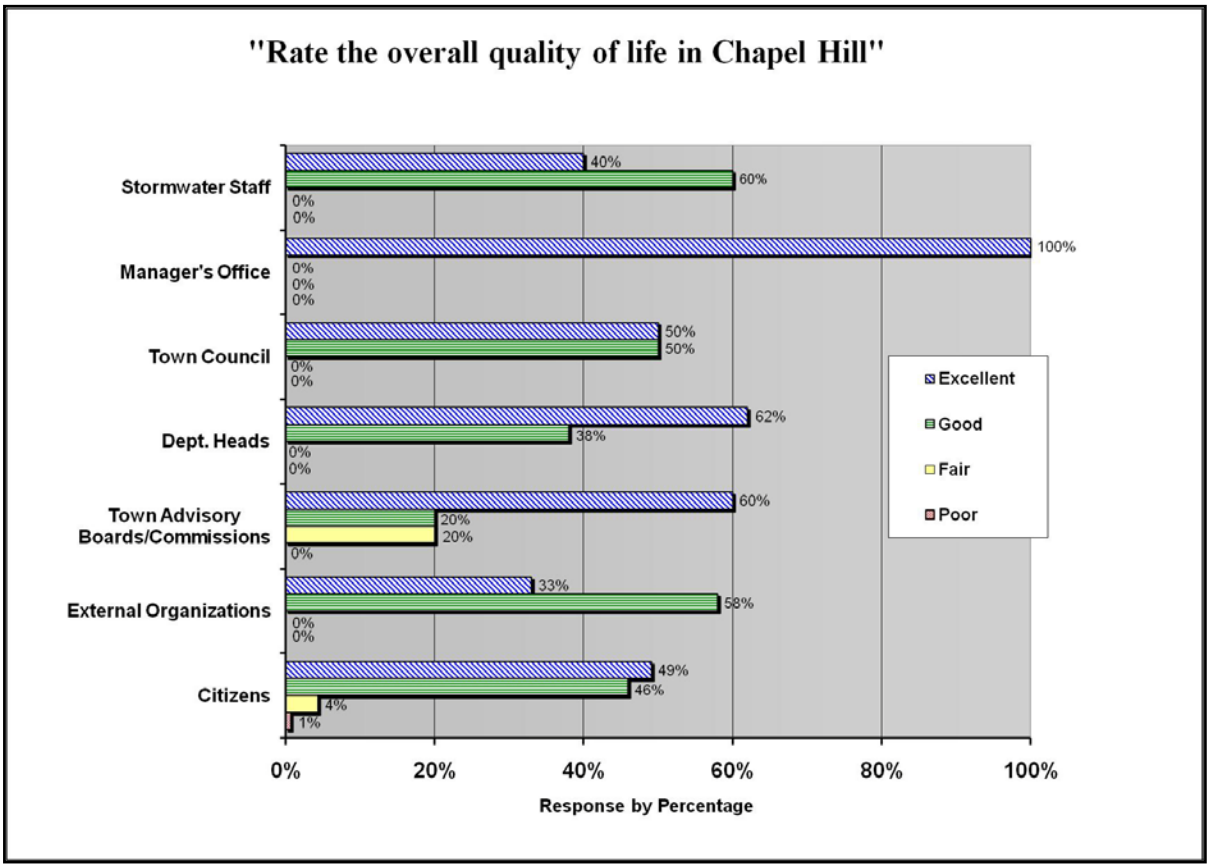
- Stormwater Advisory Board (12 completed surveys)
- Stormwater Staff (5 completed surveys)
- Town Manager's Office (2 completed surveys)
- Town Council (2 completed surveys)
- Town Department Heads and Senior Staff (39 completed surveys)
- Town Advisory Boards and Commissions (5 completed surveys)
- External Organizations (12 completed surveys), and
- Community Residents (793 completed surveys).

The balance of Section 3 provides an analysis/assessment and recommended application of highlighted comparative results from stakeholder surveys. The topic is given as the section header, followed by the survey results for stakeholder groups who received the given question, and then summarized with an analysis and suggested program master planning application(s).

Asking the right questions was important in development of the targeted surveys. A primary job of the consultant team was to help discover appropriate questions, review, organize, and frame the findings and recommendations, and, in general, facilitate the Town's development of the Master Plan for its Stormwater Management Program.

Other results and feedback from surveys, particularly open-ended comments from citizens and stakeholders, are included in Section 4 focusing on the "state of the current stormwater program". Each aspect of the stakeholder surveys and interviews provides valuable information in crafting the master plan and in continued implementation of the stormwater program.

Quality of Life in Chapel Hill



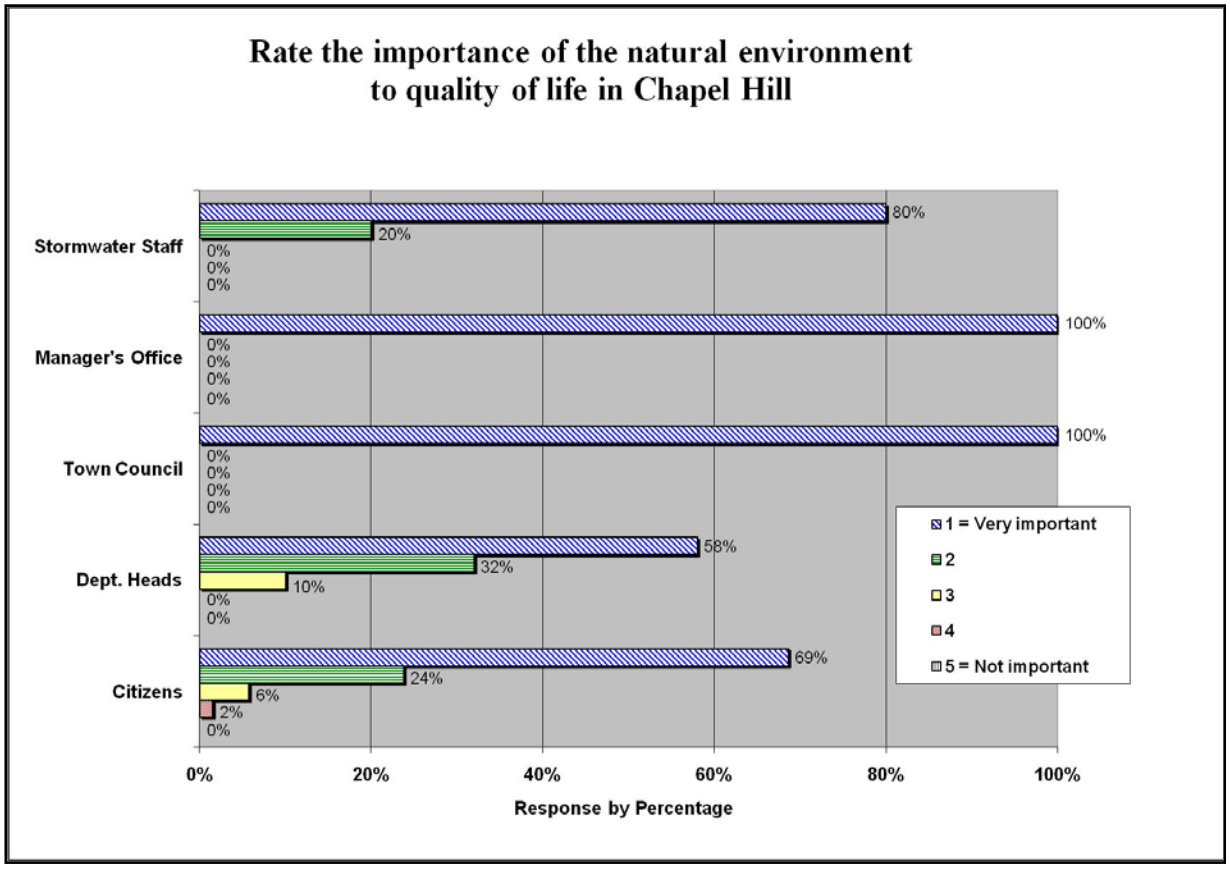
Assessment

The real and perceived quality of living and working in the Chapel Hill community has been rated highly by a number of people and organizations throughout the years. As an introduction to the master plan survey, stormwater program stakeholders were asked to rate the overall quality of life in Chapel Hill. Ratings of "excellent" and "good" resulted in large part from each stakeholder group questioned, with only a minor handful of citizens responding "fair" or "poor". On balance, 57% of targeted survey group responses rated overall quality of life in Chapel Hill as "excellent" and 37% as "good".

Application(s)

Success (or lack thereof) from the municipal stormwater management program will, in fact, directly affect quality of life in Chapel Hill. Understanding the desire for high quality of life in the community, the master plan must include a clear focus on how the stormwater program links *tangibly* to community value and why resources must continue to be allocated to ensure the current and future success of the program. The next question asks stakeholders to assess the importance of the natural environment to their rating of quality of life.

Importance of the Natural Environment to Quality of Life in Chapel Hill



Assessment

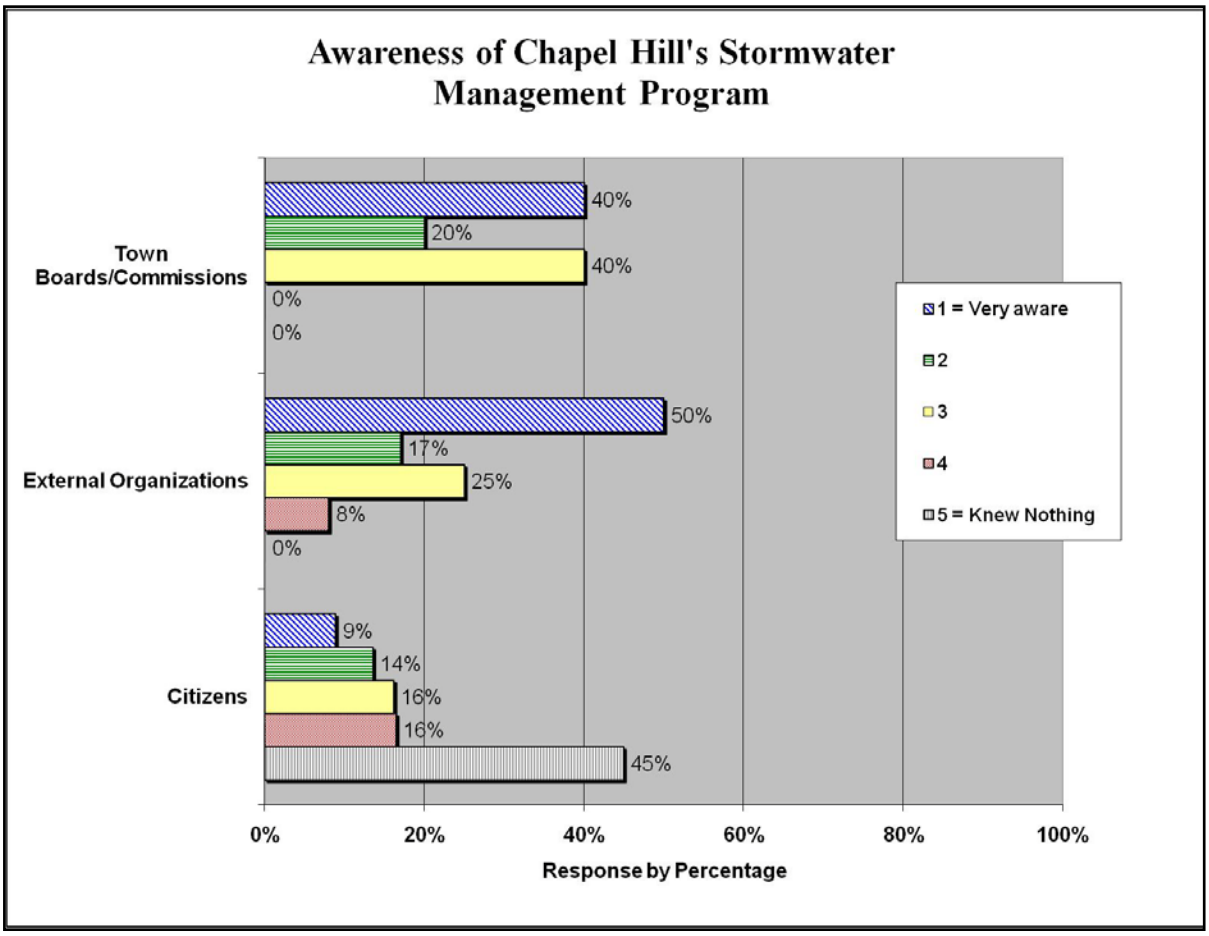
The natural environment which includes creeks, streams, lakes, and other surface waters are "very important" to quality of life in Chapel Hill, according to each stakeholder group surveyed. A positive implication should be generally strong support for the local stormwater management program. Following increased public awareness of the stormwater program and its supporting stormwater utility fee (i.e., see the next two survey questions), it will be important that people understand how their fee is utilized in protection and restoration of local surface waters and the ecosystem.

Application(s)

The stormwater education program should continue to provide direct examples and applications of how stormwater management contributes to protection of natural resources in Chapel Hill. Stream restoration programs are excellent examples of how stormwater management relates directly to natural resource protection and enhancement. Many citizens enjoy regular walks along greenways adjacent to streams, and continued efforts to stabilize and restore degraded stream banks and riparian areas will be highly visible to the community. Educational materials targeted to each population segment of Chapel Hill should contain guidance for how people, organizations, and businesses may get involved with the stormwater program and directly contribute to environmental protection at the local level.

Within the program master plan, leverage this finding to build upon the high collective rating of overall quality of life to specifically demonstrate the importance of the stormwater program, to help present the rationale for enhanced future stormwater services, and to show how the stormwater fee is used for programs and services that help sustain and improve the natural environment, as well as provide for drainage infrastructure maintenance, etc. More than satisfying regulatory mandates, a successful municipal stormwater management program contributes significantly to protection of quality of life in the community including the natural environment. Strong community support for the natural environment is conducive to building a progressive local stormwater management program.

Public Awareness of Chapel Hill's Stormwater Management Program



Assessment

One of the most surprising findings from the representative citizen survey is that almost one-half of resident respondents "knew nothing" about the Town's Stormwater Management Program. While chairs of Town Advisory Boards/Commissions and heads of external organizations of interest were generally aware of the Town's stormwater program, many rate-paying citizens were unaware. At the same time, citizens in Chapel Hill are aware of stormwater, water quality, and environmental-related issues, in general.

It is plausible that because the Chapel Hill stormwater utility fee (also see survey results on following page) is billed on the annual County tax bill, many residents may not realize that the Town has developed a formal stormwater management program. There are also a relatively high percentage of temporary students (around 15,000) living in Chapel Hill. To create further community value from the high level of environmental interest and education of residents and students, collaborative efforts between UNC and the Town to increase public awareness of available stormwater programs, services, and volunteer opportunities will be beneficial. Citizens who were aware of the Town's Stormwater Management Program noted the following sources of program awareness (Table 12).

Table 12 – Sources of Awareness of Town Stormwater Management Program

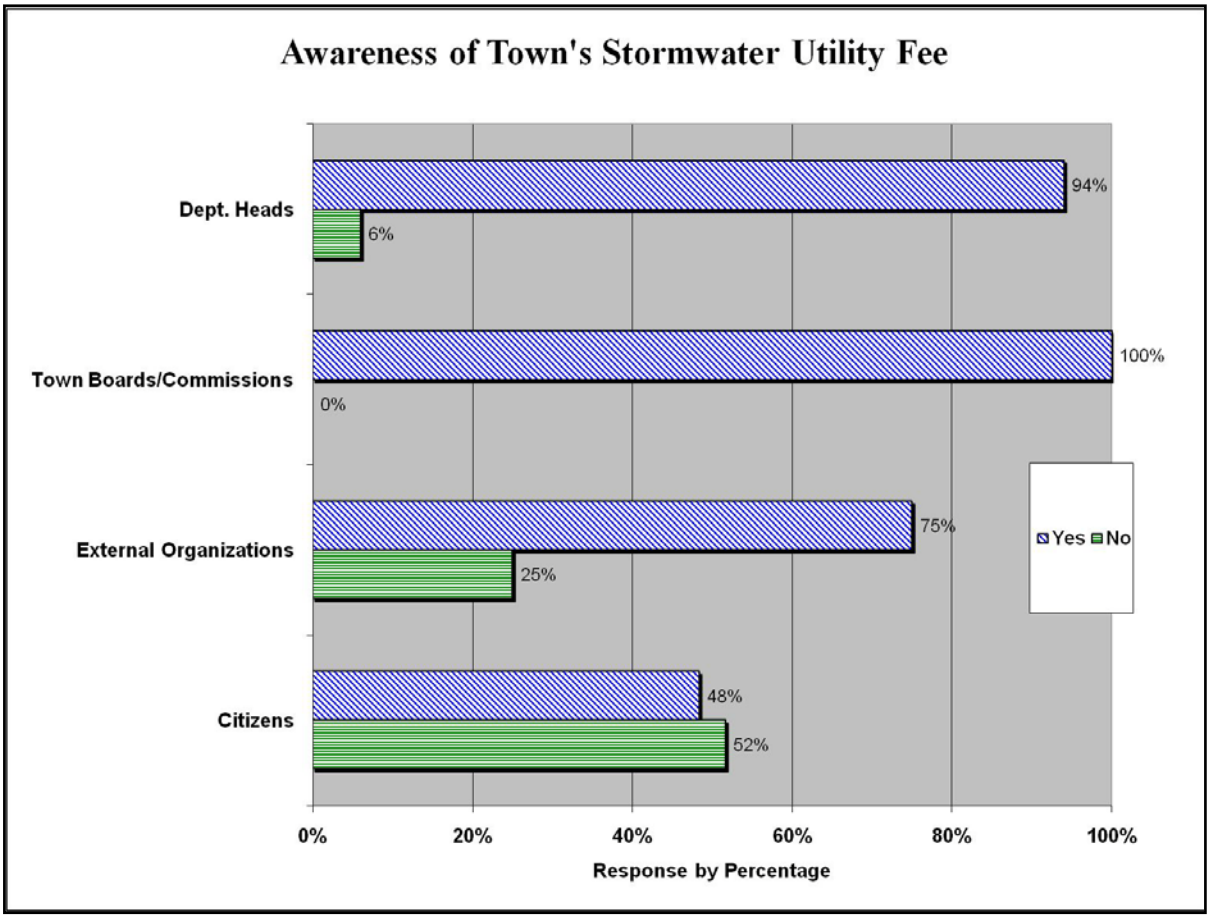
Source(s) of Awareness of Town Stormwater Management Program	Number of Respondents
Newspapers	120
Tax Bill or Fee Statement	66
Town Meetings / Council Meetings (present &/or broadcast)	26
OWASA	26
Friends and Family	23
Direct Mail	22
Town News, Website, Agendas via email	20
Literature from Town (flyers, brochures, etc)	13
Development and LUMO/RCD issues	12
Flooding (especially Eastgate), flood insurance, floodplain issues	11
Work (engineers, real estate agents)	10
Work being done in neighborhood	8
Recreation along creeks and trails	8
The citizen survey	6
Radio/TV (General response)	6
UNC classes, discussions	4
School (from kids)	4
Own research	4
Served on stormwater citizen committee	3
Marked storm drains	3
Contacted Town with drainage problems	3
Yard inlet or stream	2
Street signs	1
Garden Club talk (stormwater presentation)	1
Chamber of Commerce	1
Booth at street fair	1

Application(s)

The Town should continue and enhance its efforts to make citizens aware of the Town's stormwater program and services, and how residents may get further involved with the program. Continue to seek program and master plan collaboration with UNC and the local school system, especially in

critical public education and public involvement components of stormwater management. Serving also as an educational outreach tool, the citizen survey for the master plan helped increase awareness of the Town's Stormwater Management Program amongst sampled residents.

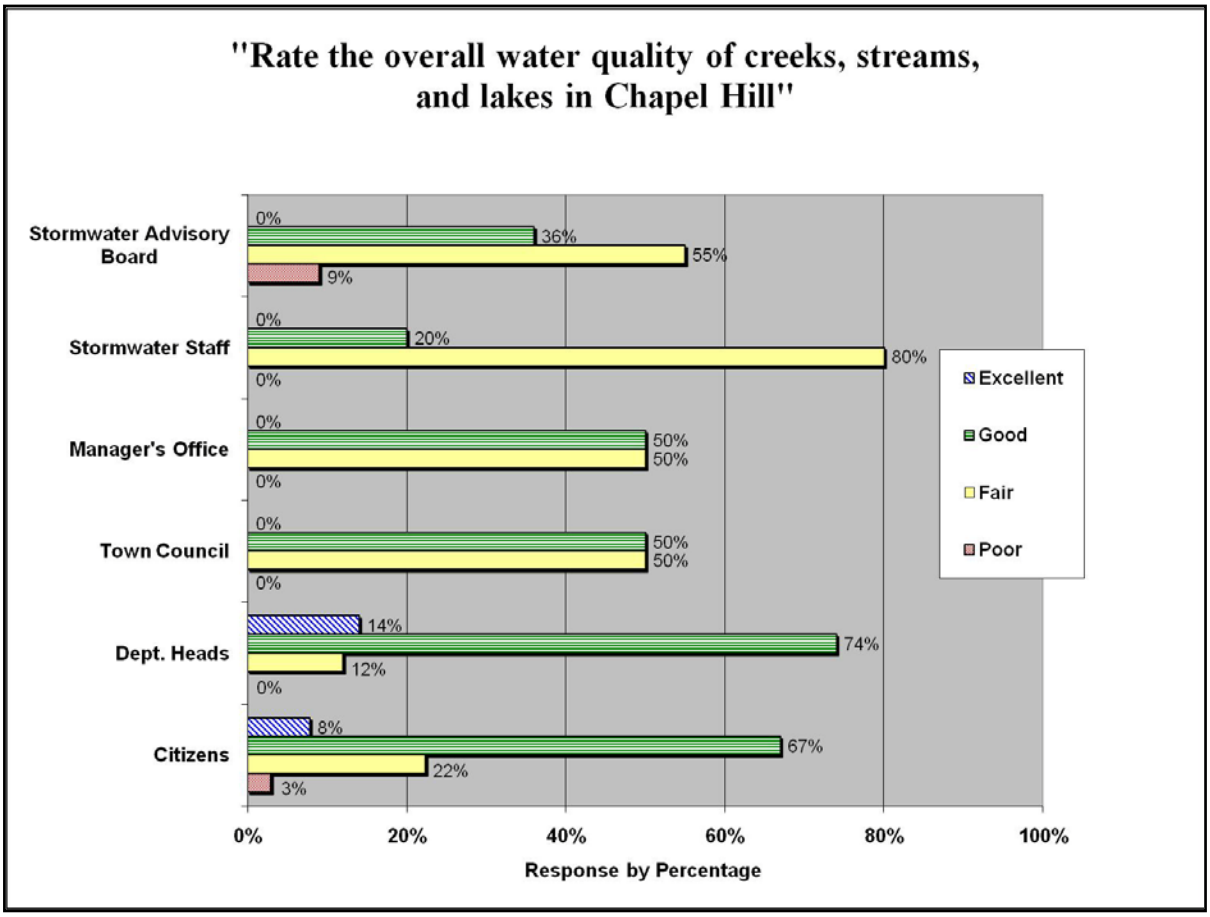
Public Awareness of Chapel Hill's Stormwater Management Utility Fee



Assessment
See analysis comments from previous section

Application(s)
See application comments from previous section

Perception of Surface Water Quality in Chapel Hill

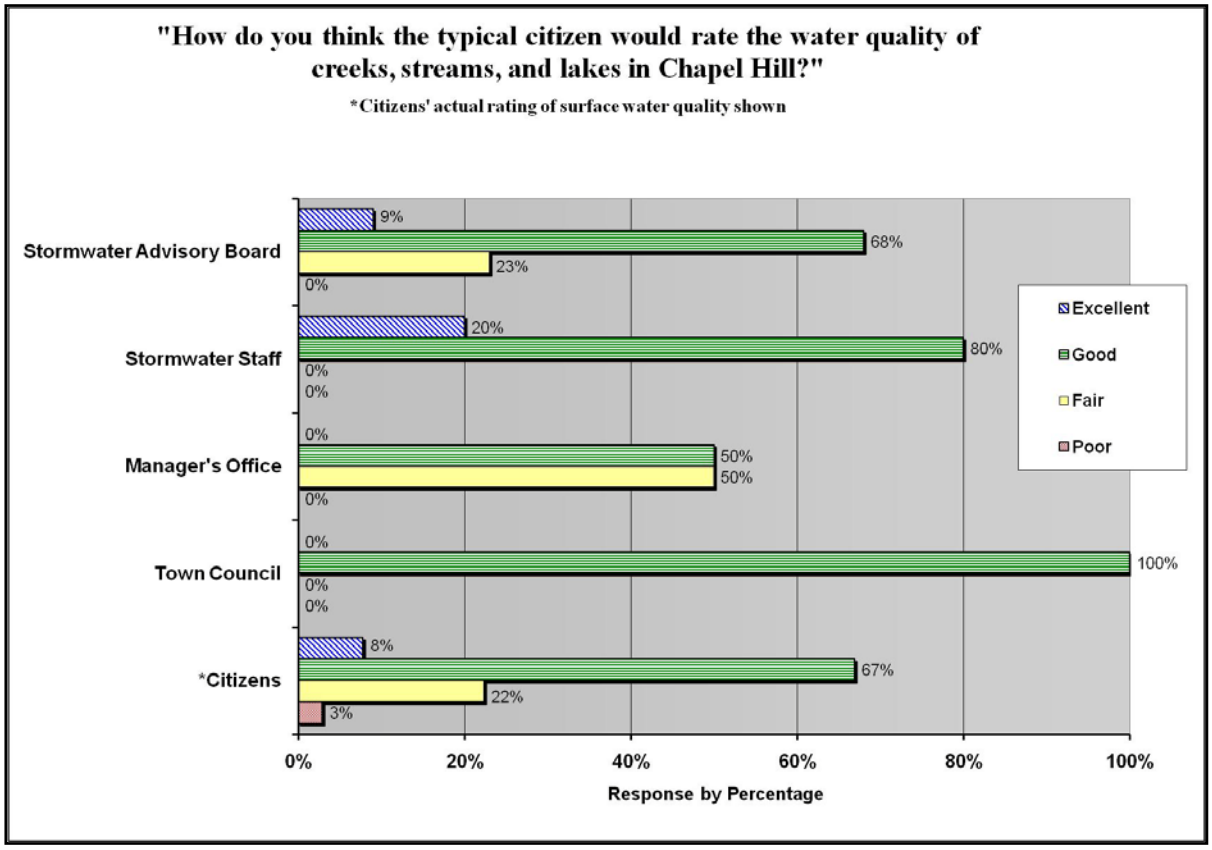


Assessment

Water quality issues or problems in streams and lakes are often not as obvious as drainage and flooding-related problems. Perhaps residents and other stakeholders have seen a creek, pond, or lake with green algal blooms on the water surface resulting from high levels of nutrients such as nitrogen and phosphorus. In many cases, however, water quality impairments are not readily visible to the lay public. Some water quality problems are also acute, such as may be caused by oil or chemical spills into streams and lakes. The majority of water quality problems in surface waters are more chronic in nature. Throughout North Carolina polluted stormwater runoff from non-point sources is the leading cause of water quality impairment for receiving surface waters.[5]

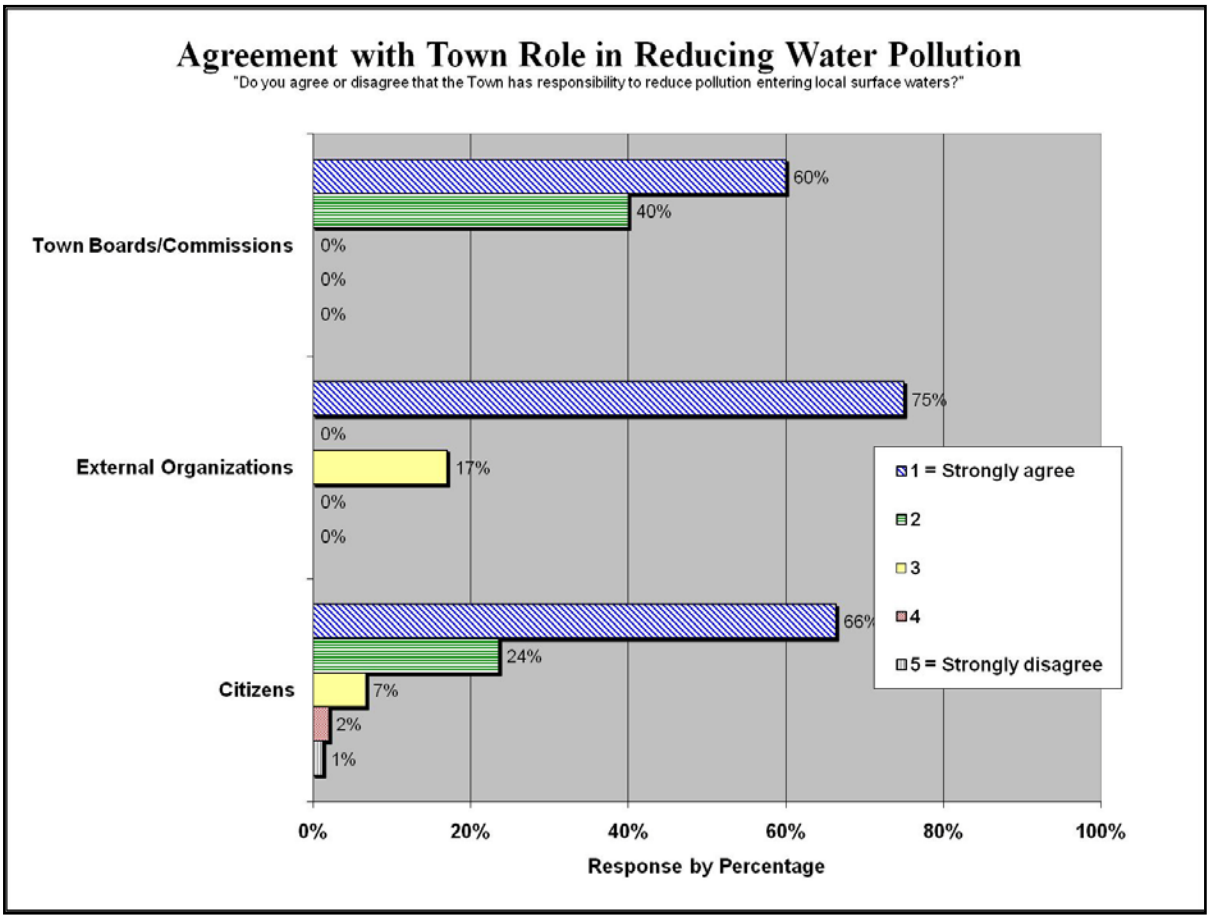
A major goal of stormwater management programs is to develop and implement Best Management Practices (BMPs) to reduce and treat pollution from varied non-point sources such as commercial and industrial areas, residential neighborhoods, institutional areas, agricultural areas, public streets, and other types of land uses and activities.

[5] Reference North Carolina Division of Water Quality – see www.ncstormwater.org for more information.



The primary pollutant that was observed during limited field reconnaissance in Chapel Hill for the initial phase of master planning was sediment along with some debris in receiving surface waters. Sediment is a primary pollutant throughout the state as well. The most preventable water pollutant is trash and debris. Increased public awareness and involvement will play a key role in helping reduce trash that ultimately runs off streets and other land surfaces into storm drains and streams. Chapel Hill's drain marking program should also contribute to further education for the public regarding illicit dumping in storm drains.

State and federal regulatory requirements are typically the primary drivers for stormwater quality management at local municipal levels. Water-supply watershed protection, erosion and sediment control during construction, Phase II of the NPDES stormwater regulations, and the forthcoming Jordan Lake Nutrient Management Strategy require that Chapel Hill develop and implement *stormwater quality management programs*. Whereas most water quality programs are regulatory-driven, local citizens agree that it is important for the Town to provide stormwater services that help reduce pollution entering local streams and lakes (i.e., see figure on the following page).



As expected, the perception of surface water quality by staff and stakeholders closest to the Town's stormwater program was, in fact, closest to reality. Stormwater Staff and the Stormwater Advisory Board both rated overall water quality as mostly "fair" which would be generally consistent with urban streams in Chapel Hill rated as "impaired" by the State.

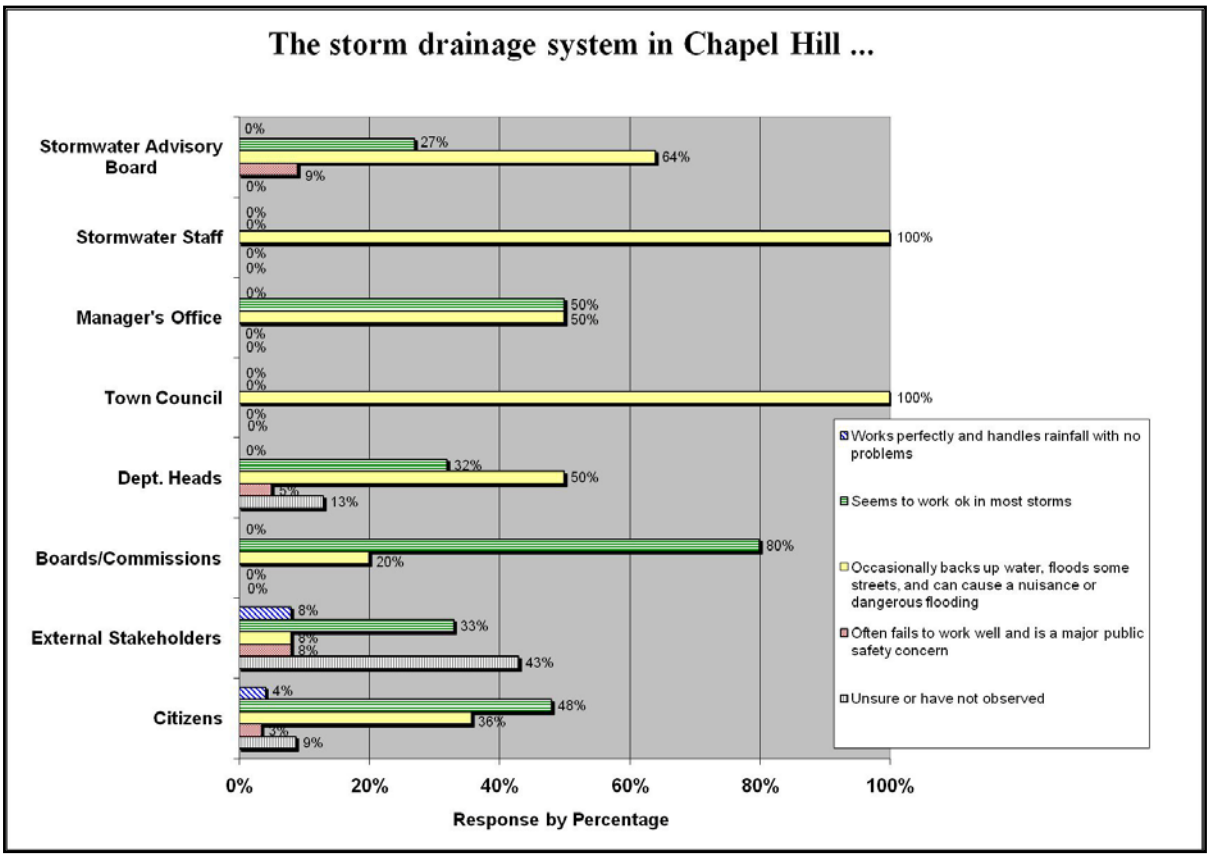
Application(s)
Develop further public education materials to highlight and explain in lay terms *actual water quality conditions* in local streams and lakes. From the survey, citizens strongly support the Town developing and implementing programs to reduce pollution in local receiving waters. Couple the need to provide further public information about water quality in local streams while emphasizing community agreement with the Town's leading role in helping protect and improve surface water quality.

Further inform the public about the state and federal water quality-related regulations and requirements, but place greater emphasis on why the Town is developing stormwater management programs and services to better protect local waters that are crucial to quality of life in the community. It is likely that future stormwater utility fee rate increases will be significantly driven by increased stormwater quality control requirements, such as embodied by the Jordan Lake Rules. Therefore, citizens must clearly understand why stormwater programs, services, and enabling utility financial resources are needed to protect and improve surface waters in Chapel Hill and the region.

Perception of Stormwater-Related Problems in Chapel Hill

Stakeholder groups were asked to rate the relative severity and any changes in stormwater-related problems in recent years. Stormwater problems were categorized as drainage-related, water quality-related, flooding-related, and erosion-related. The following table captures the stakeholder group composite results. Overall, stakeholder groups perceive that *all of the stormwater-related problems or issues in Chapel Hill have increased in severity* in recent years. The accompanying chart captures stakeholder group experiences and observations of performance of the local storm drainage system.

Stormwater-Related Problem or Issue	Composite			
	Increased	Decreased	No Change	Don't Know
Drainage	56.5%	27.3%	4.5%	11.8%
Water Quality	47.0%	22.0%	11.8%	19.3%
Flooding	41.8%	27.3%	14.3%	16.8%
Erosion	29.0%	25.0%	21.5%	24.5%
Composite	45.6%	17.2%	13.2%	24.1%



"I live on high property. I have not been aware of large local problems." – Chapel Hill citizen

Assessment
While the citizen living on high ground may be unaware, the most potentially hazardous impact from stormwater runoff is flooding. In addition to flooding, stakeholders were asked to broadly rate the severity of other stormwater-related problems in Chapel Hill along with observed functionality of the storm drainage system. While even the most advanced municipal stormwater program cannot prevent floods that may occur from extreme and/or intense rainfall events, progressive local stormwater programs can help *mitigate flooding hazards* over time as drainage system capital improvement projects are planned and implemented, as public awareness of floods and local flood hazards increases, and as local watershed and floodplain management plans are prepared and adopted. Made possible through the efforts of Stormwater Staff, the Camelot Village flood hazard mitigation project is an excellent early model for Chapel Hill.

Application(s)
Citizens representing a cross section of the Chapel Hill community that responded to the stormwater survey overwhelmingly believe it is important for the Town to provide stormwater services that help *reduce local drainage problems*. The Town currently manages and maintains stormwater infrastructure within the street right-of-way while offering technical advice and limited drainage assistance to private property owners. The existing Drainage Assistance Program (DAP) described in Section 2 provides some relief to property owners with relatively minor drainage problems, although current funding is limited.

Solutions to drainage problems can take many forms depending on the specific situation. Some solutions could involve shoring up an eroding section of stream bank to protect property. In other cases improvements new storm drainage infrastructure may solve or reduce the severity of localized drainage problems. In yet other cases a combination of major capital improvements and/or property acquisitions to benefit the public throughout a local watershed may be required to reduce drainage and flood-related problems. Detailed watershed master plan studies, scheduled to begin in the second phase of program master planning, are required to answer these questions. Unless the situation involves stormwater runoff from private property to private property only, the local municipal government is often the best and most significant resource to help residents with drainage problems.

Survey results also imply that *performance of the drainage system* may need to be evaluated further as part of the program master plan development and continued stormwater program implementation. Performance of the municipal drainage system is generally a function of hydraulic capacity, structural condition and integrity, and maintenance level. Hydraulic capacity can be evaluated on a localized and system-wide conveyance basis as part of the basin studies. Condition and relative maintenance level of the system can be evaluated as part of the MS4 drainage inventory, which is also a NPDES Phase II requirement. Routine and remedial drainage maintenance services are provided by the Town's Public Works Department.

Potential Sources of Surface Water Pollution in Chapel Hill

Potential Sources of Water Pollution	Group Average			
	Very Significant	Significant	Not Significant	Don't Know
Runoff from construction sites or other disturbed land areas	58.83%	39.02%	1.11%	2.07%
Runoff from commercial development	51.80%	45.04%	2.20%	1.93%
Runoff from streets and parking areas	50.54%	43.52%	5.33%	1.22%
Runoff from residential development	30.78%	65.11%	3.37%	1.48%
Improperly applied fertilizers and pesticides	36.38%	49.88%	10.98%	5.50%
Oil, grease, household chemicals, and other disposed wastes	29.23%	49.87%	16.28%	9.25%
Runoff from farms and agricultural operations	27.81%	21.83%	47.27%	6.18%
Leaking underground storage tanks	30.00%	22.50%	47.50%	
Accidental fuel or chemical spills	31.10%	19.70%	43.51%	11.13%
Discharges from septic systems	24.71%	21.15%	48.44%	11.39%
Discharges from commercial operations	26.00%	48.00%	26.00%	
Stream bank erosion	28.96%	54.50%	10.69%	11.69%
Waste matter from wildlife	25.00%	37.50%	37.50%	
Discharges from sanitary sewer systems	21.84%	36.99%	35.17%	12.00%
Discharges from sewage treatment plants	17.14%	34.03%	46.08%	5.49%
Litter	17.50%	45.00%	37.50%	
Pollutants deposited from the atmosphere	13.10%	54.50%	30.10%	4.61%
Leaking landfills	12.50%	19.50%	68.00%	
Runoff from forested or undeveloped land	1.08%	10.23%	86.92%	3.55%

Assessment

Chapel Hill citizens and stakeholder groups surveyed have a good understanding of the relative significance of various potential sources of surface water pollution. In the table of potential pollution sources above, the averages of all group ratings are arranged by combining "very significant" ratings with "significant" ratings. In this context, "runoff from construction sites or other disturbed land areas" was rated the overall most significant potential source of water pollution while "runoff from forested or undeveloped land" was rated the least significant.

In fact, many studies have shown that runoff from construction sites or other disturbed land areas carries much higher sediment loads than comparative undisturbed sites. On the other end of the spectrum of potential pollution sources, runoff from forested or undeveloped land would be considered an insignificant source of water pollution relative runoff from developed urban areas. In general, as impervious levels increase so does pollutant loading from non-point sources. For a comprehensive planning perspective, stakeholders were also asked to write-in any other potential local sources of water pollution in Chapel Hill. Very few additional potential sources of pollution (or categories of sources) were identified through surveys or interviews.

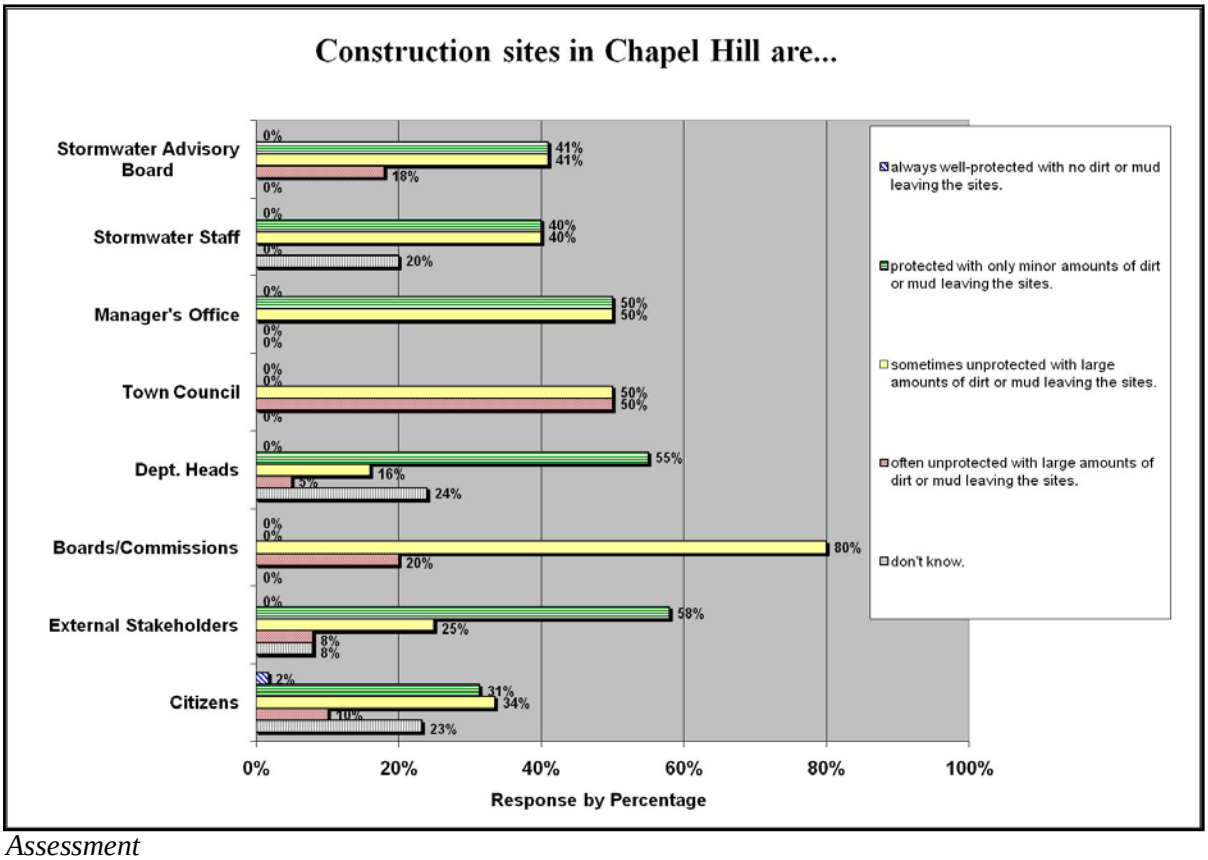
Application(s)

Particular attention will be given to the potential sources of water pollution listed in the local stakeholder-verified table above throughout the watershed assessment and program master planning process. The master plan will recommend that stormwater programs and services be provided that specifically address each significant source of surface water pollution, on both a Town-wide and watershed-by-watershed basis, as appropriate. The master plan will not assume that the list of potential pollutant sources is exhaustive, but rather will ensure that the identified significant categories are included in stormwater program planning and development, at a minimum. Detailed field work may identify additional sources of surface water pollution. However, baseline programs and services to address the list of prioritized potential sources identified above will significantly advance the Town's stormwater program, moving stepwise towards the vision of higher quality

streams and lakes in the community. Scheduled to begin in 2007/2008, the Town's illicit discharge detection and elimination program which includes an authorizing ordinance, field review tools and procedures, and enforcement process will contribute to reducing some of these sources of water pollution.

This information may also be utilized for public educational materials that focus on local sources of water pollution and ways that people and groups in Chapel Hill can help reduce or mitigate the impacts of the various sources, i.e., strong erosion control during construction activities, incentives for owners to retrofit BMPs and apply non-structural controls for existing commercial developments, etc.

Local Erosion and Sediment Control



Assessment

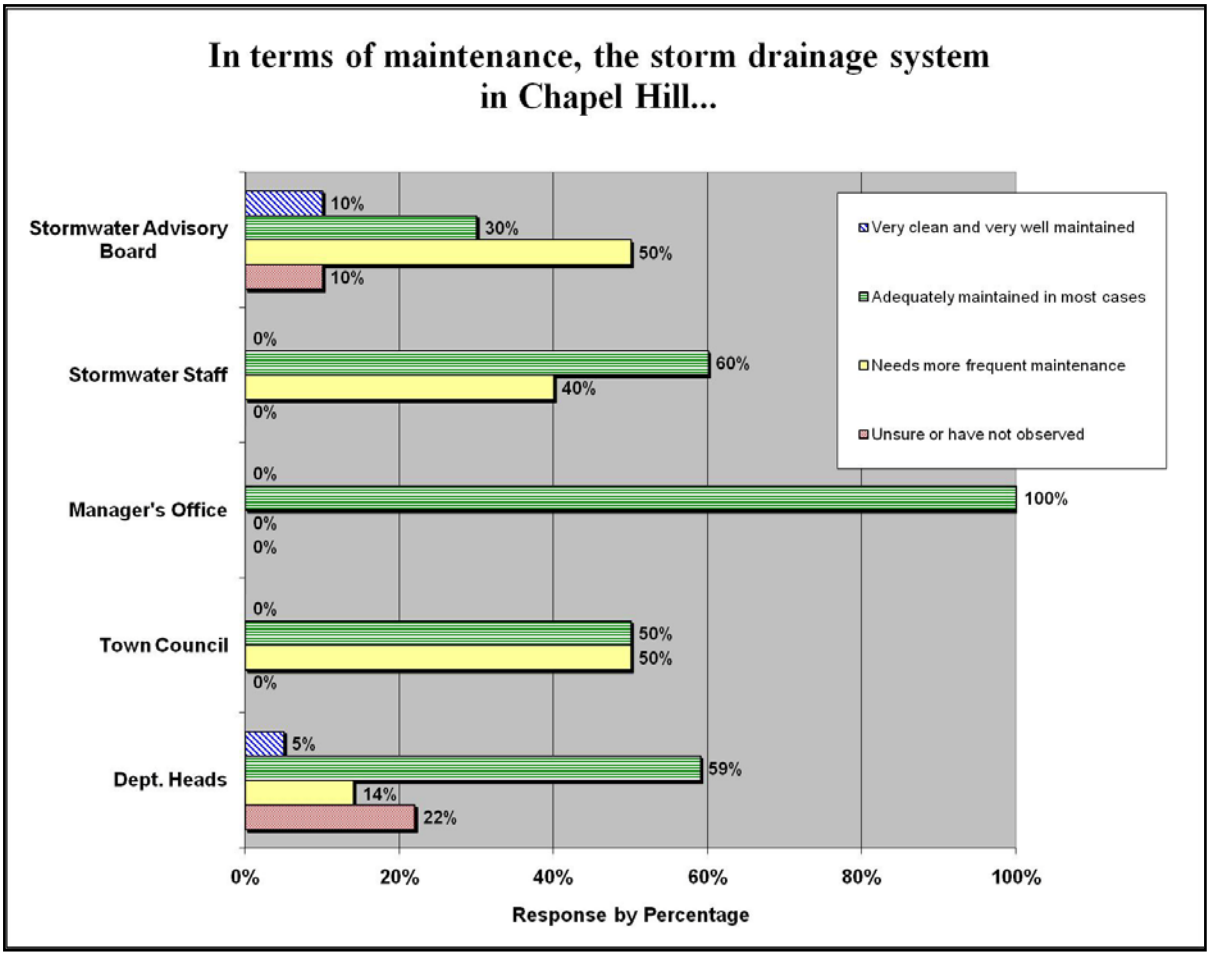
Through inter-local agreement, Erosion and Sediment Control (E&SC) during construction and land disturbance activity is administered and enforced in Chapel Hill by Orange County. While E&SC is recommended for all sites, E&SC permits are required for sites with land disturbances of 20,000 square feet or greater. Stakeholder group observations of local construction sites imply an average performance for the E&SC program. Overall group results are almost equally split between sites being "protected" and "sometimes unprotected". Stakeholder group feedback for Chapel Hill is generally consistent with qualitative observations of representative local E&SC programs across the state.

Application(s)

State Land Quality promotes the creation of local delegated E&SC programs such as exemplified by Orange County. Should the Town of Chapel Hill desire to establish a higher level of service for the

E&SC program, the Town could 1) offer to provide supplemental resources to Orange County to hire and maintain additional E&SC staff that would focus on Chapel Hill, and/or 2) develop a Town administered and enforced E&SC program. Working with staff, the program master plan will further evaluate options for enhanced E&SC programs within Chapel Hill. Typically, local E&SC programs are fully or largely funded through separate E&SC permit fees, and that is the case in Chapel Hill and Orange County. According to Town Stormwater Staff, Chapel Hill maintains a close and productive working relationship with Orange County for E&SC. Orange County E&SC Staff reports likewise regarding its positive day-to-day working relationship with the Town.

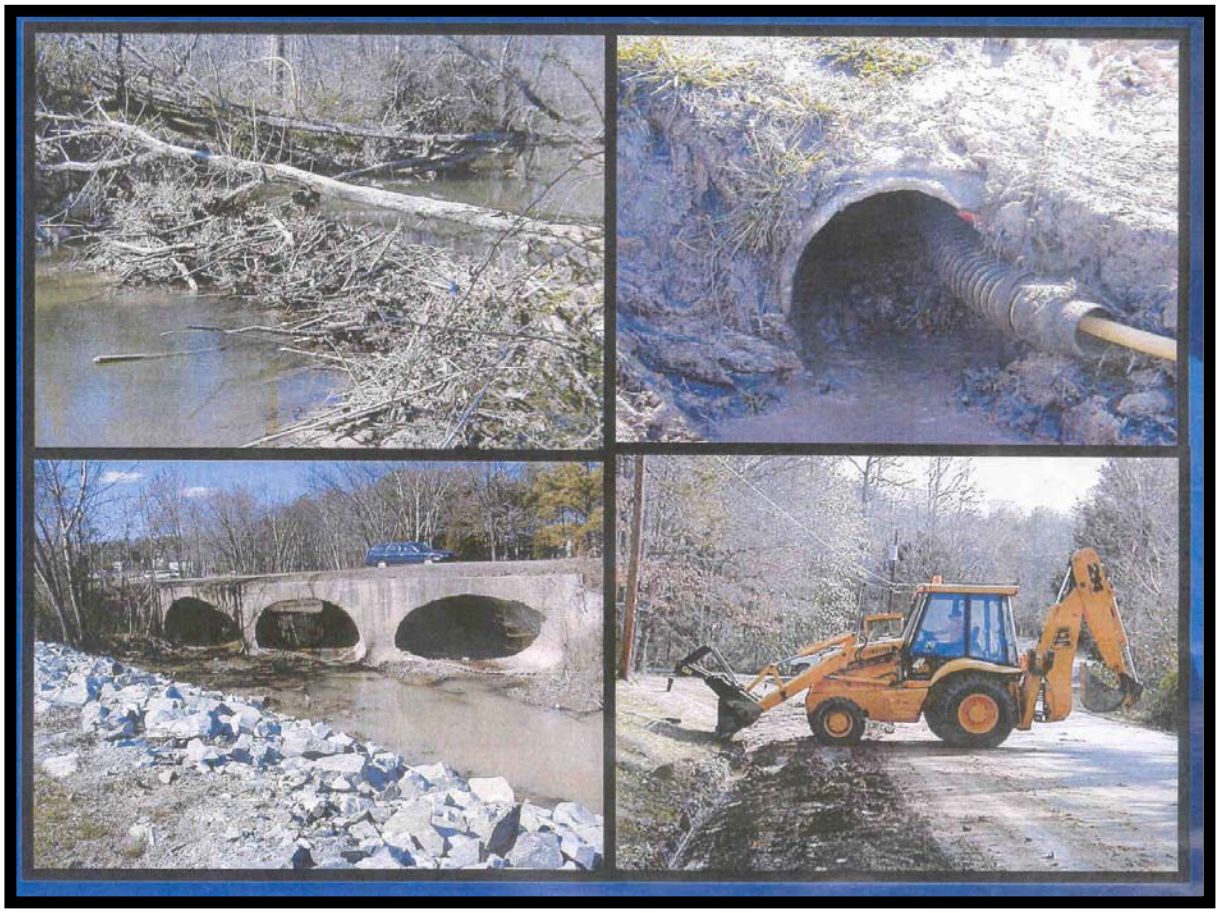
Observed Maintenance Level of the Chapel Hill MS4



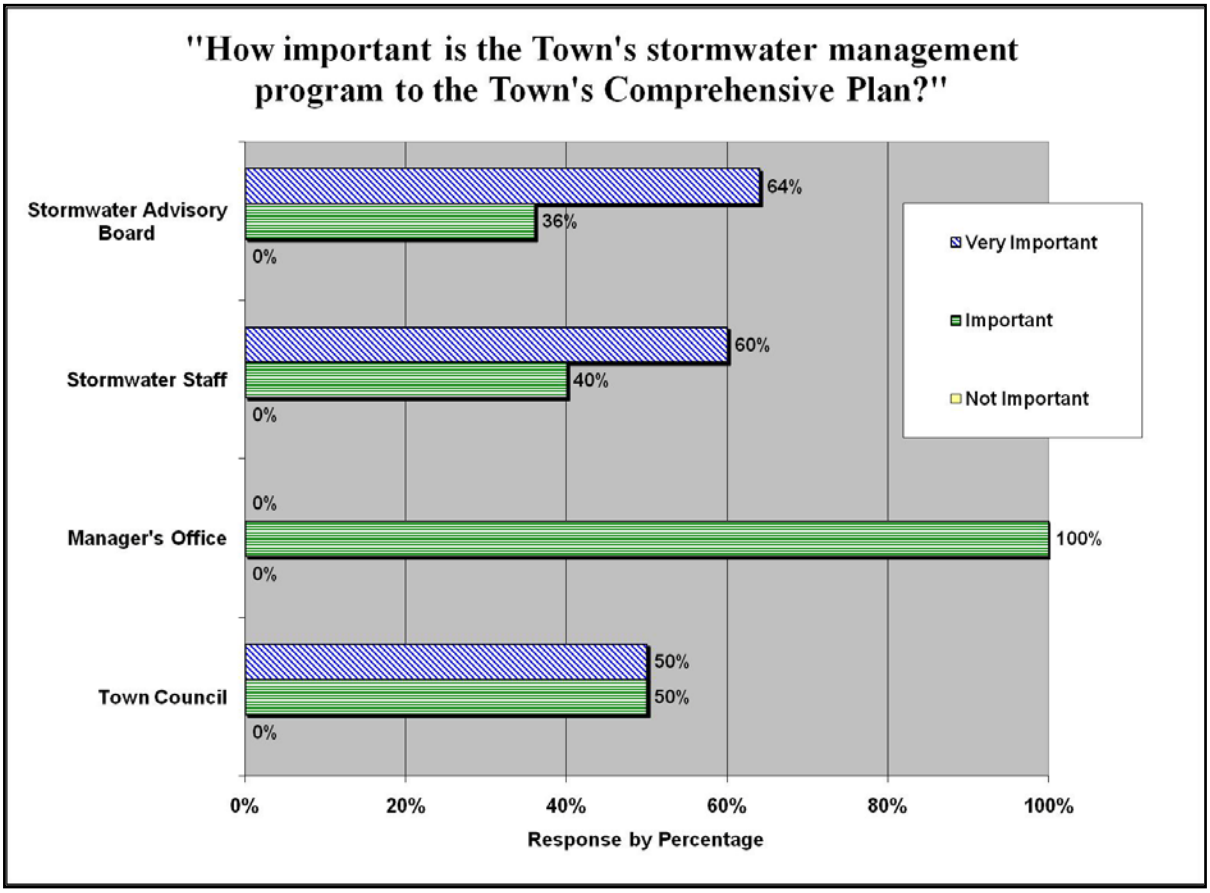
Assessment

There is some disparity amongst the stakeholder groups in the perceived and/or observed maintenance level of Chapel Hill's drainage system. Further evaluation of existing MS4 maintenance programs coupled with an accurate drainage system inventory and condition assessment would help develop a more complete picture of actual municipal maintenance levels. Unless a storm drain is clogged resulting in obvious backing up of water behind an inlet, for example, actual maintenance of the MS4 may go largely unobserved by the lay public. Street sweeping is often the most widely visible stormwater maintenance program.

Application(s)
While further review is needed, the experienced Stormwater Advisory Board believes that the MS4 needs more frequent maintenance. Develop a more complete understanding of existing drainage system maintenance levels in subsequent phases of the stormwater program master plan in order to define an appropriate future level of service. Develop balanced scorecard performance targets and measures for all stormwater-related maintenance services provided by the Public Works Department. Evaluate the financial impact to the stormwater utility of various levels of enhanced maintenance services. Along with their obvious benefits, street sweeping and other drainage system maintenance programs may also become part of the Town's strategy to comply with the forthcoming Jordan Lake rule. Maintenance is an important component of the Town's comprehensive stormwater management program.



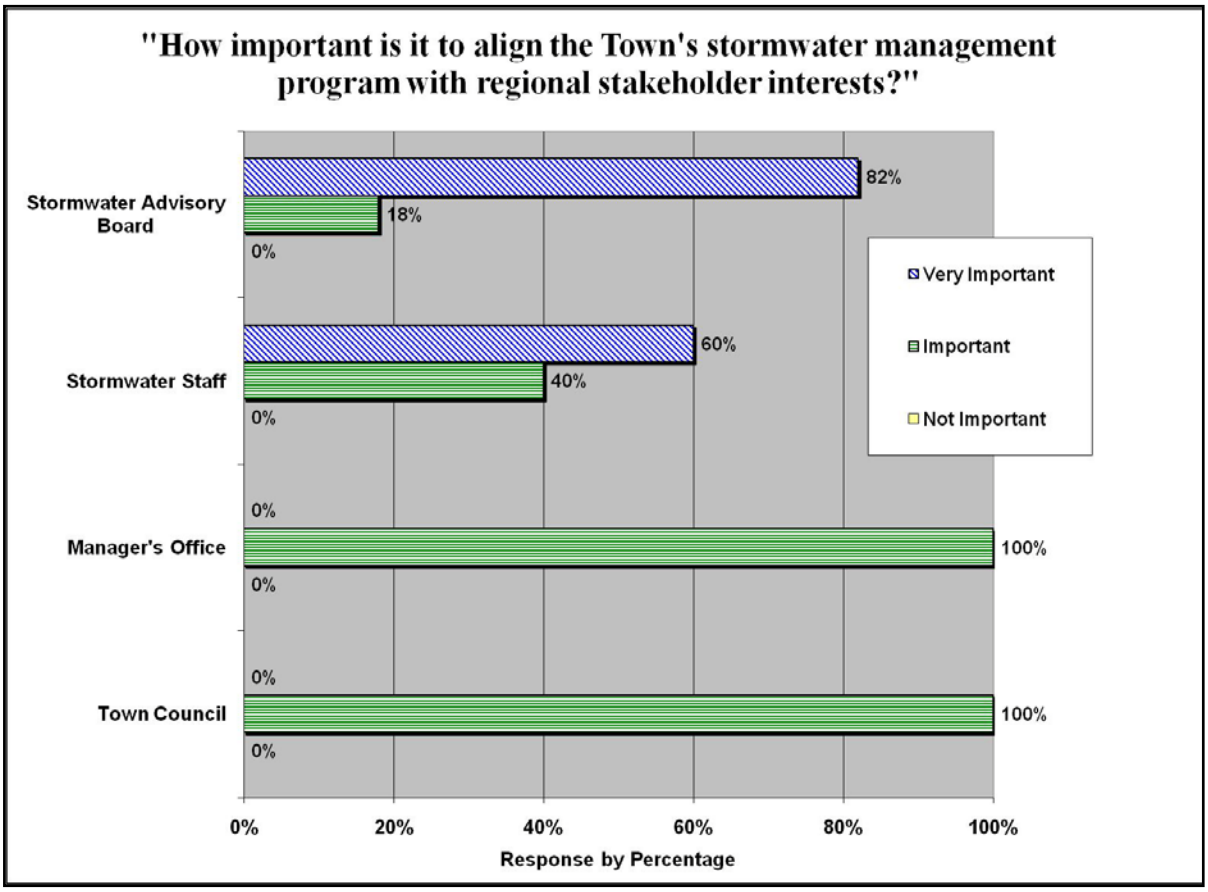
Importance of the Stormwater Program to the Town's Comprehensive Plan



Assessment
There is strong consensus amongst surveyed stakeholder groups regarding the importance of stormwater management to the success of the Town's Comprehensive Plan. Indeed, no stakeholders responded that the stormwater program was "not important" to the Town's Comprehensive Plan.

Application(s)
It is envisioned that the Stormwater Program Master Plan will be integrated into the Town's Comprehensive Plan upon completion. Applicable community themes from the Comprehensive Plan will also be advanced in the Stormwater Master Plan.

Importance of Aligning the Town's Stormwater Program with Regional Interests



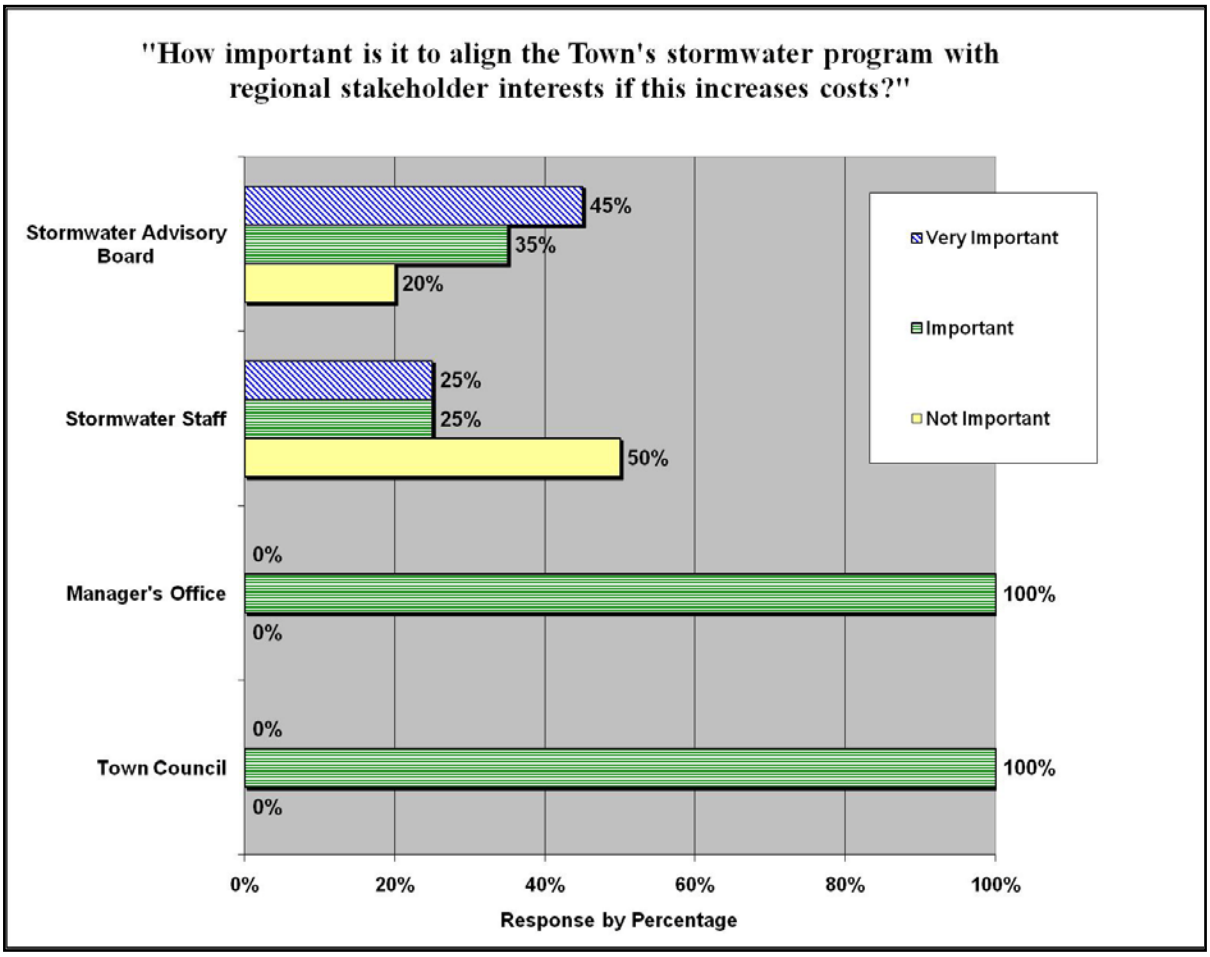
Assessment

Chapel Hill recognizes the importance of meeting both local community needs as well as supporting regional interests, such as the greater Triangle region, for example. Surveyed stakeholder groups concur with the importance of aligning the Town's stormwater program to help support regional interests. For example, Chapel Hill is currently a member of the regional *Clean Water Education Partnership*, facilitated by TJCOG. The upcoming Jordan Lake Nutrient Management Program, applicable to all of Chapel Hill and many other local governments that drain into the Jordan Reservoir, encourages a regional collaborative approach in program development and implementation, particularly nutrient trading where fitting.

Application(s)

Where practicable, the Town of Chapel Hill should continue to seek to work with regional local governments and other organizations on water resources goals of interest. In the current phase of program master planning, for example, 12 external organizations provided input regarding Chapel Hill's stormwater management program development.

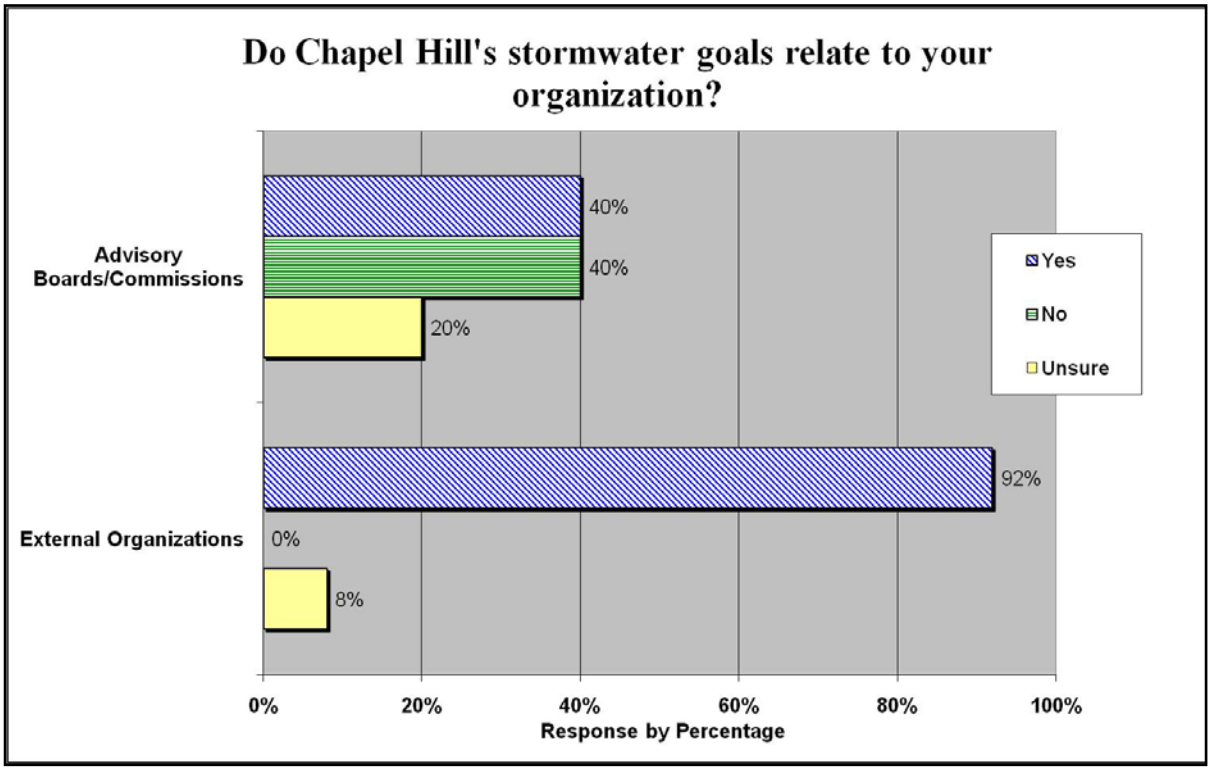
Importance of Regional Alignment if Local Program Costs Increase



Assessment
If alignment with regional interests increases costs for Chapel Hill citizens then the relative level of support for such alignment decreases somewhat as compared to the previous survey question.

Application(s)
The impact of increased costs for Chapel Hill citizens if the Town's stormwater management program aligns with regional interests must be addressed on an issue by issue basis going forward. The master planning project will continue to seek to identify regional opportunities by stormwater functional program area, as may be applicable. The Jordan Lake Nutrient Management Strategy is a pending example of a *State-mandated regional program* that will have significant implications upon Chapel Hill, cost and otherwise. Where costs may be higher due to optional regional partnering and collaboration, increased costs will be noted and Town Managers and Council will be asked to make a final decision on extent and level of service of the given activity with input from the Stormwater Advisory Board.

Relationship of Stormwater Goals with Advisory Boards and External Organizations

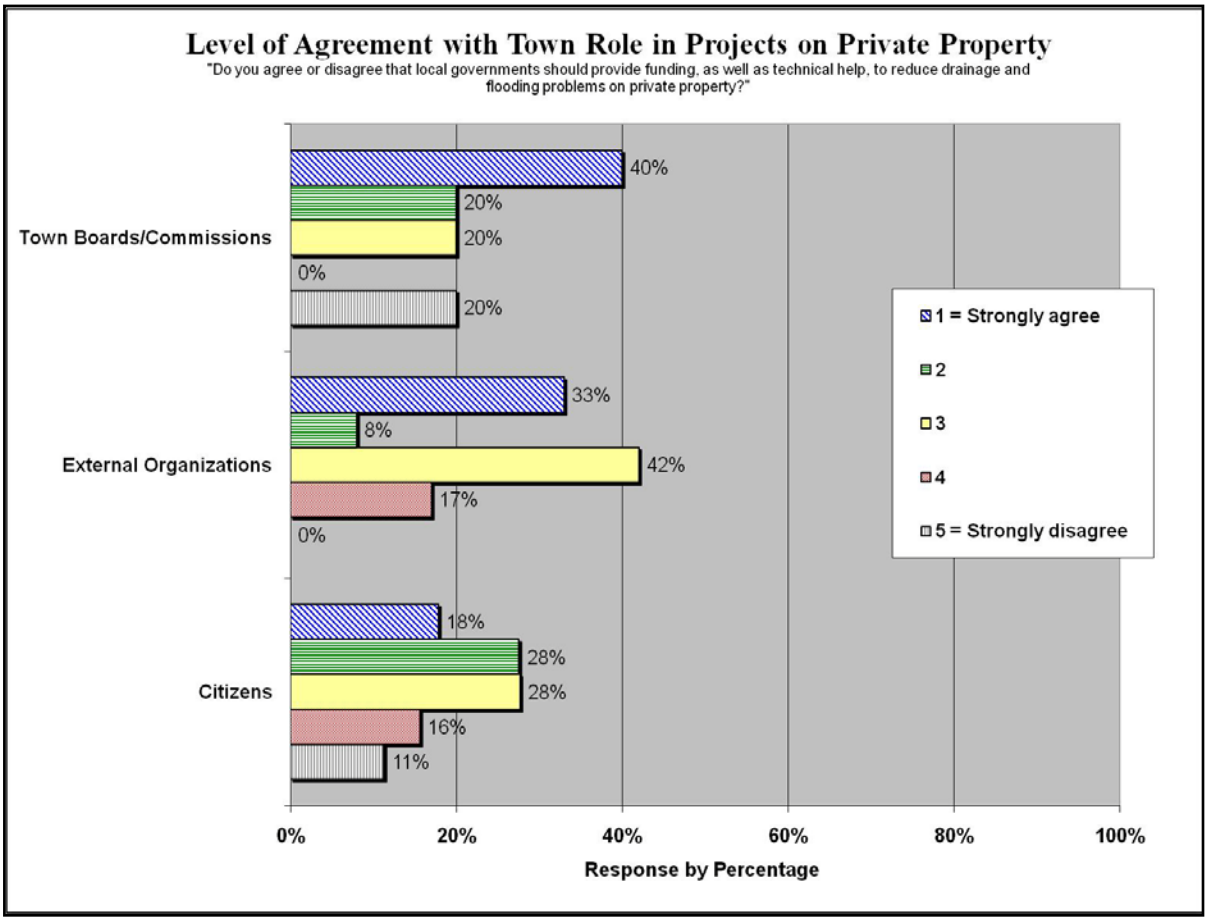


Assessment
As expected in the targeted survey, the large majority of external organizations surveyed have goals that relate to Chapel Hill's stormwater management goals. Of the external organization survey respondents, only the City of Durham Storm Water Services was "unsure" if their goals related to Chapel Hill's. Durham City/County Planning, however, replied that they have common watershed planning goals with Chapel Hill.

Town Advisory Boards and Commissions who responded that their local groups share interest in Chapel Hill's stormwater goals were the Greenways Commission and the Community Design Commission. The OWASA representative on the Stormwater Advisory Board also noted shared water resource and water quality protection goals with Chapel Hill's stormwater program. Along with UNC, Orange County, OWASA, the Town of Carrboro, and the Town of Chapel Hill Stormwater Management are leading organizations to promote the protection and improvement of surface water quality in the community.

Application(s)
Where fitting and practicable, Chapel Hill's stormwater program master plan will identify specific collaborative opportunities with both local Advisory Boards and external stakeholder organizations.

Stormwater Projects on Private Property



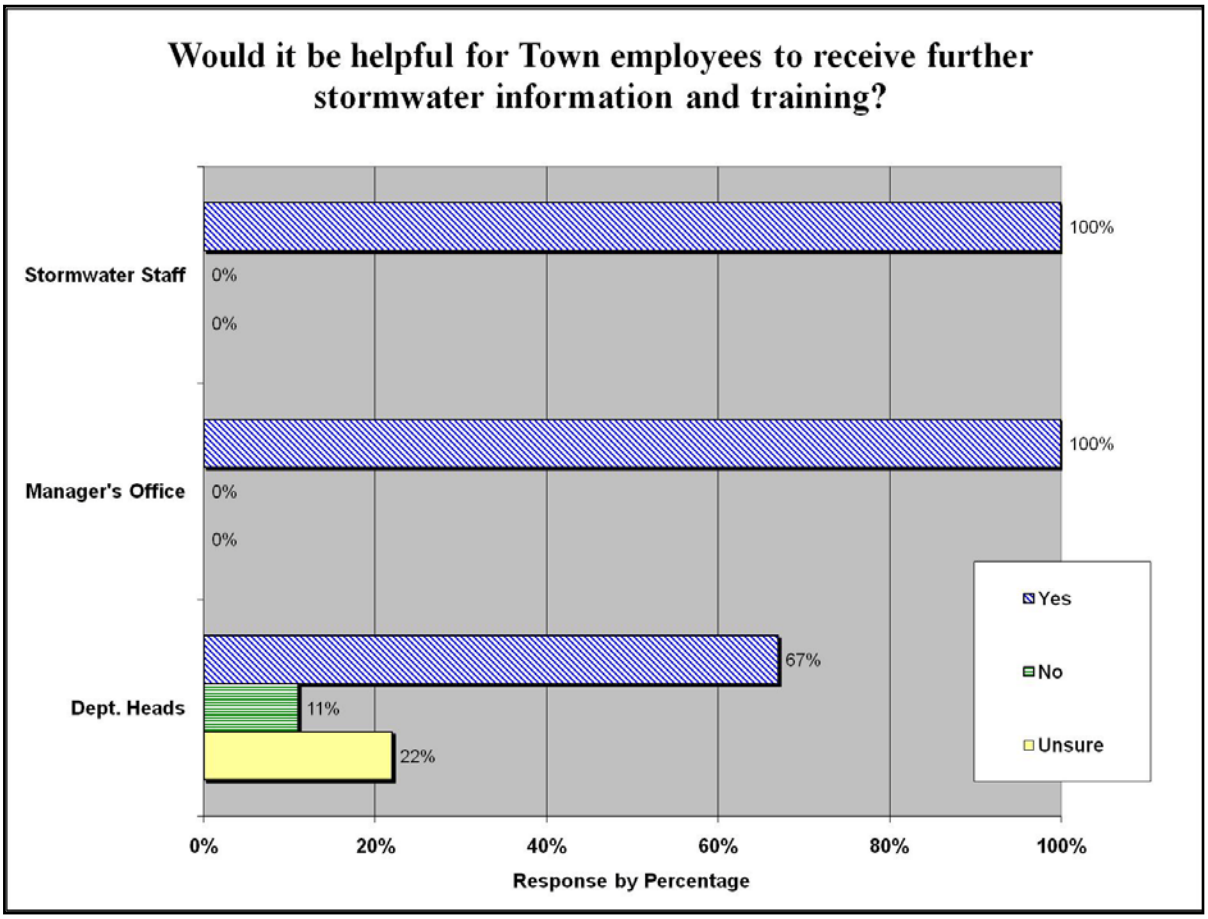
Assessment
Mixed results from stakeholder groups are evident in the question regarding the Town's role in funding stormwater-related projects on private property. The following citizen comment may capture the salient issue on this topic for stormwater management program master planning purposes:

> ***"I agree that private property should receive funding if the runoff is from public streets."***

Drainage issues that clearly involve only private runoff would not typically be within the scope of the municipal stormwater utility save staff serving as a technical resource for the property owner(s). However, when private property is impacted by stormwater runoff from public streets and other public areas beyond the control of an individual owner or even beyond the control of a neighborhood of property owners then a progressive municipal stormwater utility will often develop policies and programs to begin to help solve problems on a prioritized basis, as funding allows.

Application(s)
The groundwork for the Town of Chapel Hill to help address drainage-related problems off the traditional street right-of-way was laid years ago by a stormwater committee prior to the utility development. The first phase of program master planning confirms that each stakeholder group believes that the Town's stormwater utility should develop resources and policies to manage the *complete public drainage network and receiving stream system*. More on this strategic finding for a potential enhanced future level of stormwater services is provided in Section 4.

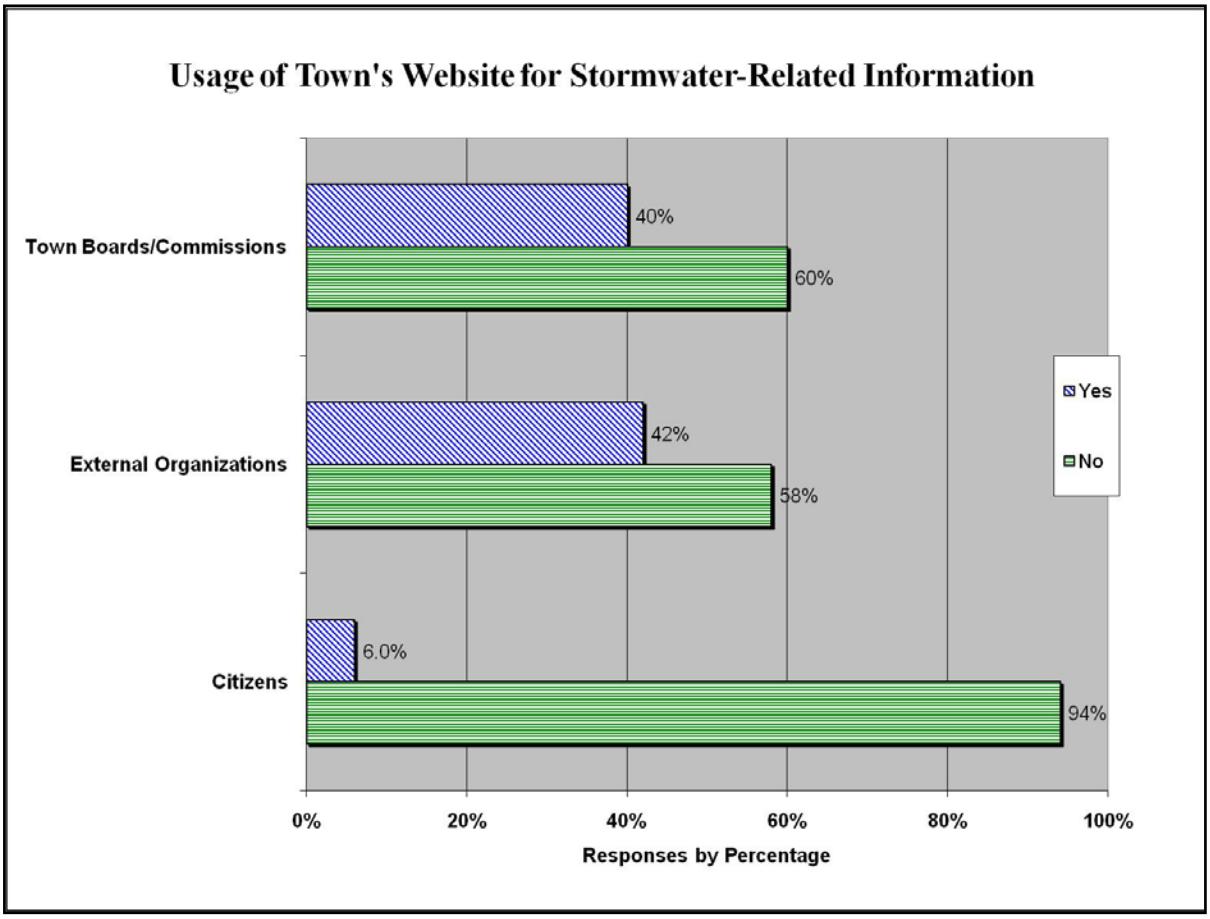
Stormwater Information and Training for Municipal Employees



Assessment
There is a clear consensus amongst Town managers and staff that Chapel Hill municipal employees would benefit from stormwater information and training. Much of the internal training is also a component of the Town's NPDES Phase II stormwater permit.

Application(s)
Develop generalized and targeted stormwater education and training programs for Town employees. Provide to new employees as part of their job orientation. Provide regular refresher courses as appropriate. Work closely with Public Works staff to develop specific materials and training for stormwater maintenance programs and services.

Usage of Chapel Hill's Website for Stormwater-Related Information



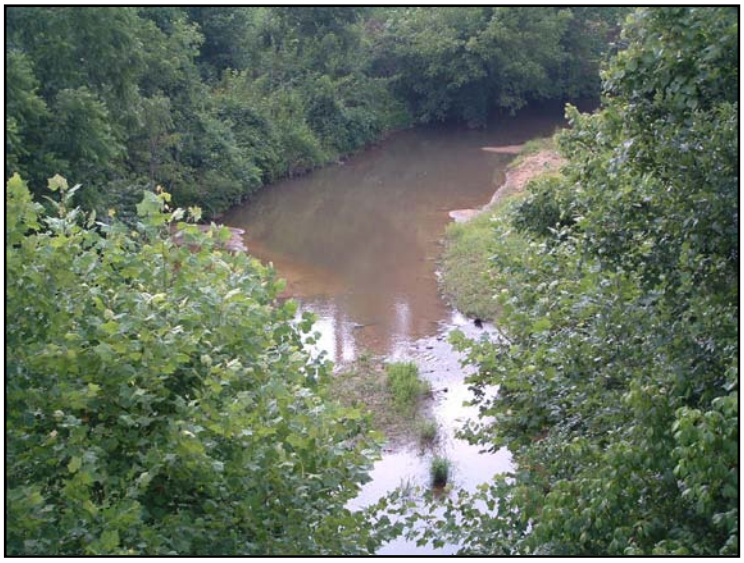
Assessment
Only about 6% of Chapel Hill citizens have used the Town's website for stormwater information. Heads of external organizations and Town Boards have used the website somewhat more than the typical citizen, however. On balance, increased awareness regarding the Town's stormwater program and website will be helpful for the local public.

Application(s)
Develop generalized and targeted public education programs that include the Town's stormwater website along with other outlets for stormwater-related information.

4 - State of Chapel Hill's Stormwater Management Program

"Generally this is a national deficiency. Chapel Hill should work to become a model for stormwater runoff (programs)." – Chapel Hill citizen

What is the current state of Chapel Hill's Stormwater Management Program?



Integrating input and feedback from Town Managers and Staff, Advisory Boards, elected officials, regional organizations, and representative citizens, this section provides a summary of the priorities, strengths, challenges, and opportunities facing the Chapel Hill Stormwater Management Program. Stakeholders will then have a master planning framework to evaluate the existing and future municipal stormwater program in light of problems, issues, needs, and desired stormwater services.

This section also includes a summary of existing key stormwater programs and services organized by the ten Council-adopted goal areas. The progressive goals and stakeholder expectations for the program may generally exceed available financial resources, which are only average when compared to other municipal stormwater utilities in the state. Given enhanced funding and time, however, Chapel Hill is well-positioned to become a model for municipal stormwater management within North Carolina and beyond.

Strategic Issues & Priorities for Chapel Hill's Stormwater Program

The three stakeholder groups that are closest to the daily activities of the Town's Stormwater Management Program (i.e., Stormwater Staff, Stormwater Advisory Board, and Manager's Office) were asked to rank the relative importance of the ten Council-adopted stormwater management goals. It should be noted that *all* of the goals are important. The purpose of the stakeholder group exercise was not to reduce or minimize the importance of any of the Council's goals for the stormwater program. Rather, just as any individual, household, business, or organization must do, there is a need to prioritize and budget for effective use of both limited time and resources. With the adoption of each annual budget, the Town Council makes authoritative allocations of local value in determining which municipal programs and services will be provided and to what level. In implementing the Stormwater Management Program it is important to similarly recommend prioritization of goals with respect to the highest and best usage of available stormwater utility resources.

Table 13 contains results from the group forced rankings of the ten goals for the stormwater program. Priorities are arranged from most important to 10th most important based on the group composite rankings, with equal weighting given to each group. Development and implementation of a comprehensive Program Master Plan was the highest priority overall.

Table 13 – Rankings of Stormwater Program Priorities
(1 = most important priority, 10 = 10th most important priority)

Program Priorities	Stormwater Advisory Board	Stormwater Staff	Manager's Office	Town Council	Composite
	Average Ranking	Average Ranking	Average Ranking	Average Ranking	Composite Ranking
Develop & implement a comprehensive Master Plan	1.27 (1)	3.40 (1)	5.50 (5)	1.00 (1)	2.79
Protect and restore natural stream corridors	5.36 (5)	6.00 (7)	2.00 (1)	3.50 (3)	4.22
Ensure compliance with federal and state regulatory mandates	4.64 (2)	3.80 (3)	3.00 (2)	6.00 (4)	4.36
Address stormwater quality	4.64 (2)	3.60 (2)	3.50 (3)	6.50 (6)	4.56
Define level of service and performance standards	5.30 (4)	3.60 (2)	8.50 (9)	2.00 (2)	4.85
Address stormwater quantity (flooding)	4.91 (3)	5.80 (6)	4.50 (4)	5.50 (5)	5.18
Develop formal public education and involvement program	5.82 (6)	5.40 (5)	6.50 (6)	6.50 (6)	6.06
Integrate programs to utilitize resources efficiently	6.55 (7)	5.20 (4)	8.00 (8)	6.00 (4)	6.44
Establish clear stormwater program leadership to public	7.45 (8)	8.60 (9)	7.00 (7)	8.00 (7)	7.76
Establish understanding of the stormwater system as a "utility"	8.64 (9)	8.40 (8)	6.50 (6)	10.00 (8)	8.39

Following is a strategic-level summary of the current Town of Chapel Hill Stormwater Management Program with respect to each Council-adopted priority.

(1) Develop and implement a comprehensive Master Plan

Ranked as the most important program goal, the stormwater master plan is currently in progress. This report represents the culmination of the first phase of master plan development focusing on establishing the plan and process for the master plan, the strategic framework for the plan, a review of the existing stormwater program and program context, and stakeholder input. The Town plans to complete the master plan within five phases totaling approximately five years. As in any significant multi-year effort, it will be important for the Town to continue to demonstrate planning progress along with early tangible examples of stormwater program and project successes. Keeping the stormwater program in the eye of the public, highlighting early capital improvement projects, stream cleanups, and other activities will help build increased awareness and support for the program.

The progressive scope of the Town's stormwater program master plan entails both a strategic operational business plan for the utility along with prioritized development of watershed studies, technical projects, and CIP program implementation. As designed and envisioned, Chapel Hill's program master plan will be a model for municipal stormwater management.

Successfully completing the program master plan will require continued budgetary resource allocation, continued strong commitment and involvement from Stormwater Staff and other program stakeholders, and continued support and input from the Advisory Board, Town Management, and elected officials.

(2) Ensure compliance with federal and state regulatory mandates

While only the designated regulatory agencies can verify the Town's compliance with federal and state regulations, it appears that the Chapel Hill stormwater program generally satisfies minimum applicable regulatory requirements, particularly when compared to similar cities and towns in North Carolina. Key regulations include the state-mandated water supply-watershed protection program, the federal and state-mandated NPDES Phase II stormwater program, the federal and state-mandated

floodplain management program, and the state-mandated erosion and sediment control program during land disturbance activity. In the coming year the Town may work with DWQ staff to review the LUMO relative post-construction stormwater control requirements for NPDES Phase II. Farther reaching than the Town's initial NPDES Phase II permit, the forthcoming state-mandated Jordan Lake Nutrient Management program will add significantly to the Town's scope of stormwater control, both for new development and existing development.

EPA-sponsored audits to ensure local stormwater program compliance with municipal NPDES Phase I/II permits have begun in recent years in North Carolina. The stormwater programs in Durham and Winston-Salem (both are NPDES Phase I municipalities) have been audited over the past several years. It is likely that other local programs in NC will be audited in coming years. While audits for the larger cities (such as Charlotte, Raleigh, Greensboro, etc.) may be a higher priority for the state and EPA, the Town can continue its diligent work to document its actions and reports in implementing the NPDES stormwater program. Chapel Hill's stormwater program implementation will also include targets and measures designed to promote and track compliance with regulatory mandates, drawing in part upon EPA-endorsed program benchmarks and guidelines.

(3) Address stormwater quality

While dealing with stormwater quality and quantity are significant challenges for any municipality, the Town of Chapel Hill is in the early stages of its comprehensive stormwater quality management program. Stormwater quality management requirements for new development are contained within the LUMO including runoff quality controls and buffers for intermittent and perennial streams. In fact, Chapel Hill's stream buffer rules exceed state-minimum mandates and are among the more protective in the state.

Although controls on new development and redevelopment match or exceed requirements of many municipalities, much work is ahead to begin to address runoff from existing developments, develop a formal plan to stabilize and restore receiving streams, adopt utility-fee based incentives for enhanced stormwater quality control BMPs on private property, develop further targeted public education and involvement programs, develop watershed-based models and master plans for stormwater quality and quantity, and implement the CIP program to address both quality and quantity goals. Non-point source runoff is the leading cause of stream impairments, and the Town of Chapel Hill is not alone in the costly initiative to develop local programs to reduce and treat pollution in stormwater runoff.

While severe drainage and flooding problems are limited to certain geographic areas of Chapel Hill (i.e., see Figure 12 for major flood hazard areas), stormwater quality management is a town-wide issue. The illicit discharge detection and elimination program, slated for development and implementation in FY 07/08, will be a significant town-wide program to identify and eliminate various sources of anthropogenic pollution to local surface waters. The rate-paying public must also understand and appreciate the fact that measurable improvements in receiving stream water quality will likely take years to realize given the growth and urbanization of the town over a number of previous decades in the absence of any significant stormwater management requirements.

(4) Protect and restore natural stream corridors

Since 2003, LUMO stream buffer requirements have helped protect intermittent and perennial streams for development projects within the designated RCD. Legacy developments in many cases may not have significant protection for sensitive streams, however, and work will be required to restore and enhance these areas to the extent practicable over time, perhaps as redevelopment occurs. A minor amount of stream restoration may be planned as part of the FY 07/08 Burning Tree CIP project, but formal stream restoration is an expensive proposition that has been beyond the effective

reach of the Chapel Hill stormwater program to date. Significant capital improvement funding will be required for the Town to make notable progress towards stream restoration goals. The Town should continue to seek outside support from NC EEP and NC Clean Water Management Trust Fund to help with implementation of local stream restoration projects.

The Manager's Office rated stream corridor protection and restoration as the top goal for the Chapel Hill stormwater program. The Manager's Office keenly perceives that local streams are highly visible to the general public, thus stormwater utility programs to protect and improve stream corridors are typically well-received by the community, especially after a few restoration projects have been completed and publicized. Again the challenge is funding and implementation.

(5) Address stormwater quantity (flooding)

While areas of severe flooding are limited in Chapel Hill, the cost to solve or mitigate hazardous flooding problems is usually very expensive. Strategically there are only three choices to deal with flooding situations, and the first option is not desirable: 1) tolerate the flooding (i.e., a potentially hazardous or damaging scenario), 2) change the nature of the flood, and/or 3) abandon the floodplain. Unless the flooding situation is minor and does not put people or property in harms way, then option one is effectively not an option.

Left with options two and three, both are indeed difficult and costly. To change the nature of the flood would involve significant detention and/or major conveyance system changes within the watershed of interest. To abandon the floodplain, which in many cases is the most cost effective solution, involves acquiring and demolishing structures on property which is highly flood prone. The hazard mitigation grant for Camelot Village is an example planned buy-out project that employs option three. To date it is the most significant project administered by Stormwater to begin to deal with established areas of severe flooding in Chapel Hill.

Several programs will, over time, benefit stormwater quantity (flooding) management in Chapel Hill. For example, the updated floodplain maps recently competed by the State better display flood hazard zones along major creeks in Chapel Hill. In addition, the LUMO requirements for new development and redevelopment require that the quantity of stormwater runoff be evaluated and fitting controls be incorporated for plan approval.

Much work remains for the Town to deal with legacy flooding issues, such as Eastgate Shopping Center, and outdated drainage systems, however. The stormwater CIP coupled with ongoing pursuit of flood hazard mitigation grants provide a means to continue to advance the goal of reducing stormwater quantity-related issues. CIPs will also be identified and prioritized through subsequent watershed plans. Current dedicated funding for the CIP is limited so the number and scope of improvement projects will continue to be relatively low in the near-term. Maintaining, replacing, and upgrading stormwater system infrastructure is a town-wide issue, and will involve significant resources, financial and otherwise.

Stormwater staff has also been tasked with other priorities that reduce the amount of time available to develop and manage projects under this goal area.

(6) Define level of service and performance standards
This goal area is an important component of the program master plan. To date, general levels of service and performance standards for the Town's stormwater program have been assumed by satisfying early components prescribed within the NPDES Phase II permit and accomplishing priority municipal tasks such as responsible plan review, customer billing service and record management, and overall program development including public education. In sum, establishing and reporting *formal levels of service and performance standards* for the Town's stormwater program is integral to the master plan project. Section 2 captures level of service baseline observations from the first phase of master planning, while potential performance measures are provided later in Section 4.

(7) Develop formal public education and public involvement program
Overall, the Town is doing an above-average job in development and implementation of its initial stormwater public education, outreach, and involvement program. Chapel Hill's funding for the important educational program area, on a comparative percentage of total revenue, is generally higher than other municipalities in North Carolina. In addition to storm drain markers, advertisements, brochures, the website, participation in the CWEP, presentations to school and civic groups, the baseline citizen survey performed in conjunction with the first phase of the master plan exemplifies progressive educational outreach and involvement activities. At the same time, it is recognized that important work remains in this goal area, particularly in further collaboration with the University and in generally increased public awareness of and involvement with the Town's stormwater program.

(8) Integrate programs to utilize resources efficiently
This is another goal area that is within the scope of the program master plan to help the Town define formal ways, where fitting, to integrate various stormwater programs. The Town desires to look at both internal and external opportunities for efficient stormwater program collaboration and integration.

(9) Establish clear stormwater program leadership to the public
As evidenced from the baseline citizen survey results, many community residents are currently unaware of the Town's stormwater management program. It is recommended that the Town "brand" the stormwater program as the program master plan develops to further raise awareness and help establish recognizable leadership to the public. Also tying into the next goal area, it will be helpful for the Town to think of other well-known utilities that are effectively branded such as OWASA, Duke Energy, Progress Energy, etc. Similarly, developing a recognizable brand for the Town's stormwater management program will be beneficial. For example, the highly successful stormwater management program in Charlotte and Mecklenburg County is known as "Charlotte-Mecklenburg Storm Water Services".

Lead staff and stakeholders will be encouraged to brainstorm potential stormwater program names, stormwater service "tag lines", and perhaps a unique stormwater program logo to promote increased awareness and help establish clear program leadership for the public.

(10) Establish an understanding of the stormwater system as a "utility"
Establishing a public understanding of the stormwater system as a "utility" closely links with the previous goal of establishing clear stormwater program leadership. Based on the citizen survey results, today a majority from the public in Chapel Hill would not recognize the Town's Stormwater Management Program, are not aware of the Town's stormwater utility fee, and by extension would not likely comprehend the stormwater system as a "utility" in the sense of traditional utilities such as water and sewer, electricity, gas, telephone, etc.

Program Strengths, Weaknesses, Accomplishments, and Challenges

"I still disagree with the stormwater (fee) made yearly on our church... since the church was constructed in 1999 and had numerous stormwater management features and requirements including a pond and everything as part of the construction plan…"
– Chapel Hill citizen

The citizen comment speaks directly to the need for a stormwater utility fee crediting system in Chapel Hill. In addition to the question of an appropriate fee crediting system, Stormwater Staff, Stormwater Advisory Board members, and the Manager's Office were asked to rate the relative strength of various key elements of the existing Chapel Hill Stormwater Management Program. Based upon work during the first phase of master planning, the consultant team observes that staff and stakeholder ratings of strengths and weaknesses of the existing stormwater program are both accurate and consistent. Table 14 displays the targeted group comparative and group composite results. In the composite ranking each group is given equal weighting. An immediate application of the first phase findings, a stormwater utility user fee crediting policy is slated for development as part of the second phase of the program master plan project.

Table 14 – Ratings of Town Stormwater Program Components

(3 = strength, 2 = a positive with room for improvement, and 1 = weakness of current program)

Element of Program	Stormwater Advisory Board	Stormwater Staff	Manager's Office	Composite
	Average Rating	Average Rating	Average Rating	Composite Ranking
Stormwater capital improvement programs	1.40	1.30	1.00	**1.23**
Fee crediting program	1.50	1.00	n/a	**1.25**
Public awareness and acceptance of the stormwater fee	1.60	1.20	1.00	**1.27**
Appropriate level of financial resources to implement program	1.41	1.60	1.50	**1.50**
Performance indicators for stormwater program	1.40	1.30	2.00	**1.57**
Linkage of stormwater program to Town Comprehensive Plan	1.45	1.30	2.00	**1.58**
Drainage assistance programs for residents	2.09	1.40	1.50	**1.66**
Appropriate level of staff resources to implement program	1.55	1.60	2.00	**1.72**
Stormwater system maintenance services	1.60	1.60	2.00	**1.73**
External grant opportunities to leverage local resources	1.67	2.50	2.00	**2.06**
Volunteer involvement in stormwater programs	2.18	2.00	n/a	**2.09**
Erosion and sediment control during construction	1.70	2.30	2.50	**2.17**
Local water quality sampling and monitoring program	1.68	2.00	3.00	**2.23**
Support for the program from Town Council	2.45	2.30	2.00	**2.25**
Environment of openness and desire for stakeholder input	2.18	2.60	2.00	**2.26**
Customer service on billing and other utility questions	2.41	2.60	2.00	**2.34**
Support for the program from Town Management	2.10	2.00	3.00	**2.37**
Compliance with state and federal regulatory requirements	2.15	2.80	2.50	**2.48**
Participation in the TJCOG Clean Water Education Partnership	2.57	3.00	2.00	**2.52**
Stormwater management requirements for development	1.80	2.80	3.00	**2.53**

In addition to the areas identified in Table 14, **strengths (+)** of the Town's current Stormwater Management Program include:

- Dedicated Staff, Advisory Board, & Community
- Development requirements and plan review process
- Early public education programs
- Customer service
- Support from Council and Manager
- Stakeholder input & participation
- Regulatory programs
- Active participation in development of the Jordan Lake Nutrient Management Strategy
- Setting up the Stormwater Management Program, the utility user fee system, and starting the master plan

In addition to the areas identified in Table 14, **weaknesses (-)** or challenge areas of the current Stormwater Management Program include:

- Total level of financial resources (especially relative above-average goals for program)
- Public awareness of the stormwater program and user fee
- Drainage assistance and capital improvement program funding and project implementation
- Lack of utility fee crediting program
- Incomplete and unverified MS4 inventory
- Lack of ordinance authority and staffing resources to fully implement the illicit discharge detection and elimination program
- Lack of participation in the FEMA Community Rating System (CRS) program which would likely lower local flood insurance rates
- Lack of performance indicators for programs and services
- Need further definition regarding extent and levels of service for stormwater maintenance programs supported by the stormwater utility
- Lack of formal work order management system for maintenance services
- Generally limit stormwater system maintenance and improvements to within the street right of way

- Opportunities for enhanced coordination between stormwater service-providing departments and external stakeholders
- Unclear authority for Stormwater Program Manager to direct all of the Town's stormwater-related resources
- Prior to master planning, some uncertainty about program priorities
- The need to demonstrate tangible "on the ground" results from the stormwater program

Town Stormwater Services of Importance to Residents

Asked to view stormwater services from the eyes of rate-paying residents, the Stormwater Advisory Board, Stormwater Staff, Town Department Heads, and the Manager's Office identified the representative listing of stormwater programs and services in Table 15 that are perceived to be most valuable to Chapel Hill residents. Complete results are provided in Appendix 5. The Balanced Scorecard approach that will be applied in developing strategic performance measures for the Town's stormwater program encourages organizations to include targets and measures that specifically track customer satisfaction, in this case the Chapel Hill public. Chapel Hill recognizes that it must satisfy regulatory requirements for stormwater management while also meeting its citizens' needs for local stormwater services.

Table 15 – Stormwater Programs and Services Viewed as Most Valuable to Residents

Public education & public involvement programs	Fixing localized drainage problems* *(*27% of citizens report that their property or neighborhood has drainage or flooding problems)*	Stream stabilization and restoration programs/projects	Flood control programs/projects
Trash & debris clean up	Mosquito control programs	Drainage assistance program	Stormwater drainage infrastructure maintenance
Street sweeping	Erosion control program	Capital improvement program	Monitoring for water quality and quantity
Drainage/pollution complaint response & resolution	Development review program/LUMO/RCD	Floodplain management program/NFIP	Leaf collection program *(not currently funded by stormwater utility)*

Opportunities for Internal and External Stakeholder Collaboration

Collaboration with Public Works Department

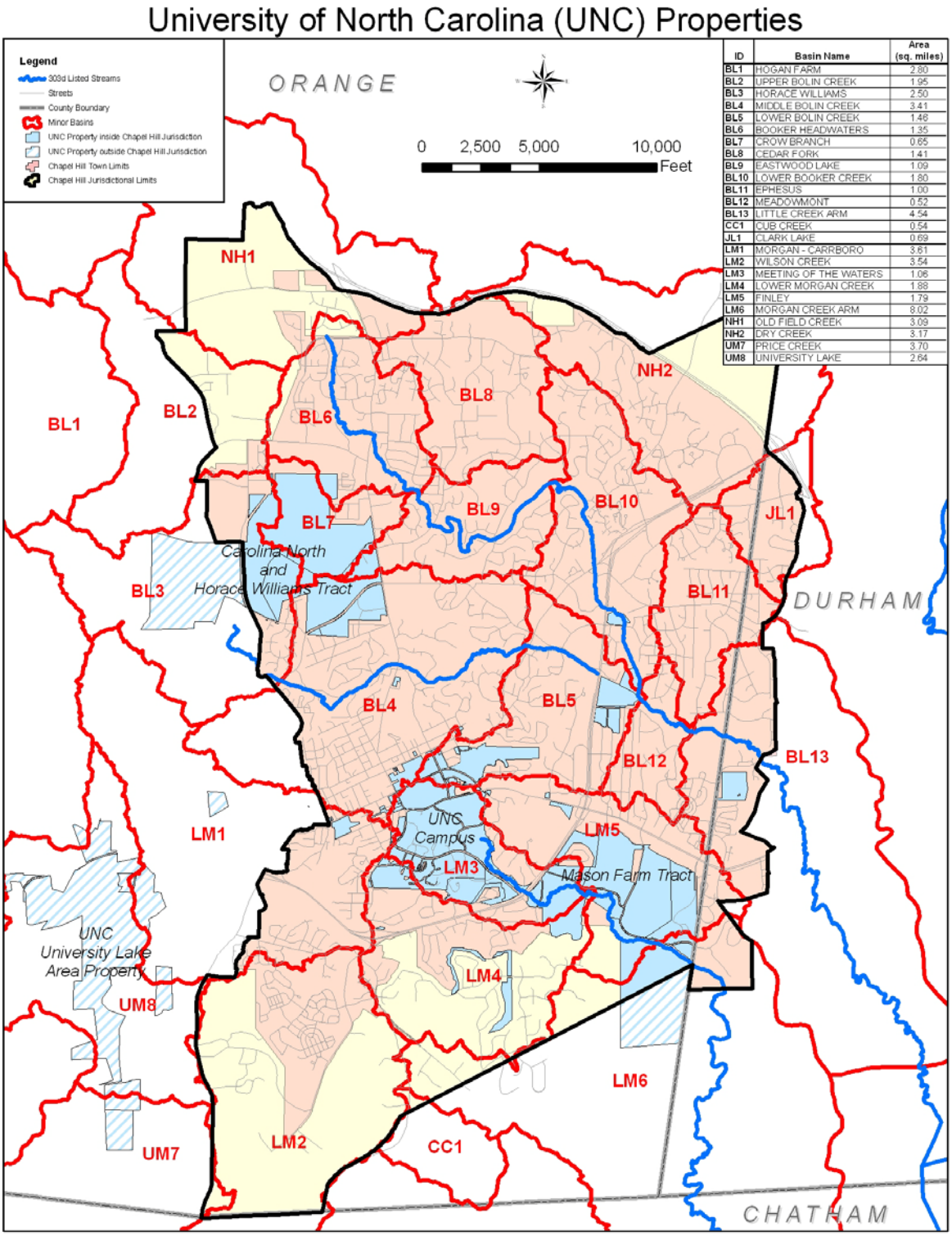
Chapel Hill Public Works staff members have been key stakeholders in the first phase of program master plan development. Public Works currently provides street sweeping and drainage maintenance services within the street right of way. Maintenance team leaders and crew members have significant practical experience with the local drainage system that can continue to benefit the Town's development and implementation of a comprehensive and well-received stormwater management program. Further incorporation of water quality protection practices into established maintenance programs and practices will result from continued internal collaboration.

In subsequent phases of program master planning, it is recommended that Stormwater Staff within both Engineering and Public Works hold several day-long working sessions, both in the office and field, to continue to strengthen the working relationship between the departments (i.e., Stormwater Management is a relatively new division and program within the Town of Chapel Hill organization), to provide input to the operational components of the program master plan, and to collaboratively develop performance targets and measures for stormwater maintenance services supported by the stormwater utility enterprise.

Collaboration with the University

The University of North Carolina at Chapel Hill (UNC) is the largest single land owner in Chapel Hill with holdings of about 1,900 acres within the Town limits and about 2,050 acres within the Town's jurisdictional area (includes ETJ). These holdings represent approximately 14 percent of the Town's corporate land area. Figure 15 shows the main UNC land areas within Chapel Hill. UNC and UNC-Hospitals is also the largest employer in Chapel Hill. As described in Section 2, the Town operates a local Stormwater Utility which generates funds to run the Stormwater Management Program which includes operating and maintaining the storm drainage infrastructure. As a fair and equitable distribution of the costs of running the Stormwater Management Program, fees are charged to all properties in the Town according to each property's amount of impervious area. To date UNC has not participated in Chapel Hill's stormwater utility fee.

In all fairness to the citizens of Chapel Hill and in keeping with precedent set by other universities (public and private) around the State (e.g., NCSU, UNC-G, UNC-W, Duke University, Wake Forest, etc.), it is appropriate for UNC to pay a municipal stormwater fee. Given that the University has its own NPDES Phase 2 permit, appropriate allowances (credits) may be in order that would reduce the fee. Such credits may be justified for activities performed by UNC such as maintenance of its drainage infrastructure, water quality monitoring on campus, and other similar activities and practices which reduce the workload of and cost to the Town's Stormwater Management Program.



ID	Basin Name	Area (sq. miles)
BL1	HOGAN FARM	2.80
BL2	UPPER BOLIN CREEK	1.95
BL3	HORACE WILLIAMS	2.50
BL4	MIDDLE BOLIN CREEK	3.41
BL5	LOWER BOLIN CREEK	1.46
BL6	BOOKER HEADWATERS	1.35
BL7	CROW BRANCH	0.65
BL8	CEDAR FORK	1.41
BL9	EASTWOOD LAKE	1.09
BL10	LOWER BOOKER CREEK	1.80
BL11	EPHESUS	1.00
BL12	MEADOWMONT	0.52
BL13	LITTLE CREEK ARM	4.54
CC1	CUB CREEK	0.54
JL1	CLARK LAKE	0.69
LM1	MORGAN - CARRBORO	3.81
LM2	WILSON CREEK	3.54
LM3	MEETING OF THE WATERS	1.06
LM4	LOWER MORGAN CREEK	1.88
LM5	FINLEY	1.79
LM6	MORGAN CREEK ARM	8.02
NH1	OLD FIELD CREEK	3.09
NH2	DRY CREEK	3.17
UM7	PRICE CREEK	3.70
UM8	UNIVERSITY LAKE	2.64

Figure 15 – UNC Areas within Chapel Hill (Source: Town & UNC, 2006/2007)

There are many tangible opportunities for UNC and the Town to work together to implement components of the Stormwater Management Program which benefit both the Town and University and which satisfy requirements in each entity's respective NPDES Phase 2 permit. For example, many University students and faculty live off campus in Chapel Hill. It is important for the public education programs to be coordinated to the extent practicable to best serve both the University and larger Chapel Hill community. In addition, the drainage systems of each UNC property (within the Town) discharge to Town jurisdictional waters and a number of Town areas discharge into streams on University properties. This interconnectedness of the systems begs for interactive management under a mutually beneficial arrangement.

Currently, the primary interactive function between UNC and the Town's Stormwater Management Program is the presence of a member of the UNC administration serving on the Town's Stormwater Management Advisory Board. Other significant collaboration between the University and Town has included development of stormwater management control requirements for the future Carolina North development. As UNC works to develop its stormwater master plan there may be further opportunities for collaboration with the Town to the benefit of UNC and the Chapel Hill community.

Collaboration with Orange County Erosion and Sediment Control Program

Through inter-local agreement, Orange County performs the Erosion and Sediment Control (E&SC) program for Chapel Hill and several other municipalities within the county. E&SC during local land disturbance activity has been required by the State of North Carolina for more than 25 years. E&SC as part of the construction site runoff control program is also one of the six minimum measures within the City's NPDES Phase II stormwater permit. The working relationship between the Town and County for the E&SC program appears to be healthy and productive, based on interviews with staff.

As noted earlier in the report, there may be an opportunity to establish a higher level of E&SC service in Chapel Hill if additional resources can be provided by the Town. Significant water quality impacts can result from construction and land disturbance activities. Thus it is important for success of the Town's stormwater management program to ensure that E&SC is implemented to the maximum extent practicable within Chapel Hill's jurisdictional limits.

Collaboration with OWASA

OWASA and Chapel Hill Stormwater Management are bound by common goals focused on protection of the quality of surface water resources, the need to deal with upcoming Jordan Lake nutrient control requirements, the need to minimize illicit discharges into receiving streams and lakes, and a desire to serve Chapel Hill and the surrounding region. An OWASA official serves on the Chapel Hill Stormwater Management Advisory Board and OWASA staff members have contributed to data review and information gathering for the stormwater program master plan.

In building the stormwater program master plan, it is recommended that the Town have continued interaction with OWASA in development of stormwater programs and services, particularly in regards to planning. A workshop between OWASA and Stormwater Staff could be a vehicle to explore opportunities to work together. It is conceivable that the Town could develop formal agreements with OWASA (or vice versa) for certain programs and services of mutual interest, such as implementation of the Jordan rule for planning nutrient controls for existing development and establishing potential nutrient trading criteria, Town input to OWASA for review in prioritizing the

rehabilitation/replacement of sewer systems in sensitive areas, cooperative illicit discharge detection and elimination programs, and educational outreach programs.

Potential Future Scope of Municipal Stormwater Services

One of the most significant findings from the initial phase of master planning is the strong desire amongst all stakeholder groups for the Town's stormwater program and utility to **manage the "complete" public drainage system**. Figure 16 displays the consensus of group feedback that the Town should further develop policies, programs, and services to manage public stormwater runoff, both within the traditional street right of way and beyond the street right of way, as appropriate. Progressive municipal stormwater utility programs have assumed *prioritized responsibility (with appropriate easements)* for managing the quality and quantity of runoff once it enters upstream street drainage inlets to all connecting systems downstream.

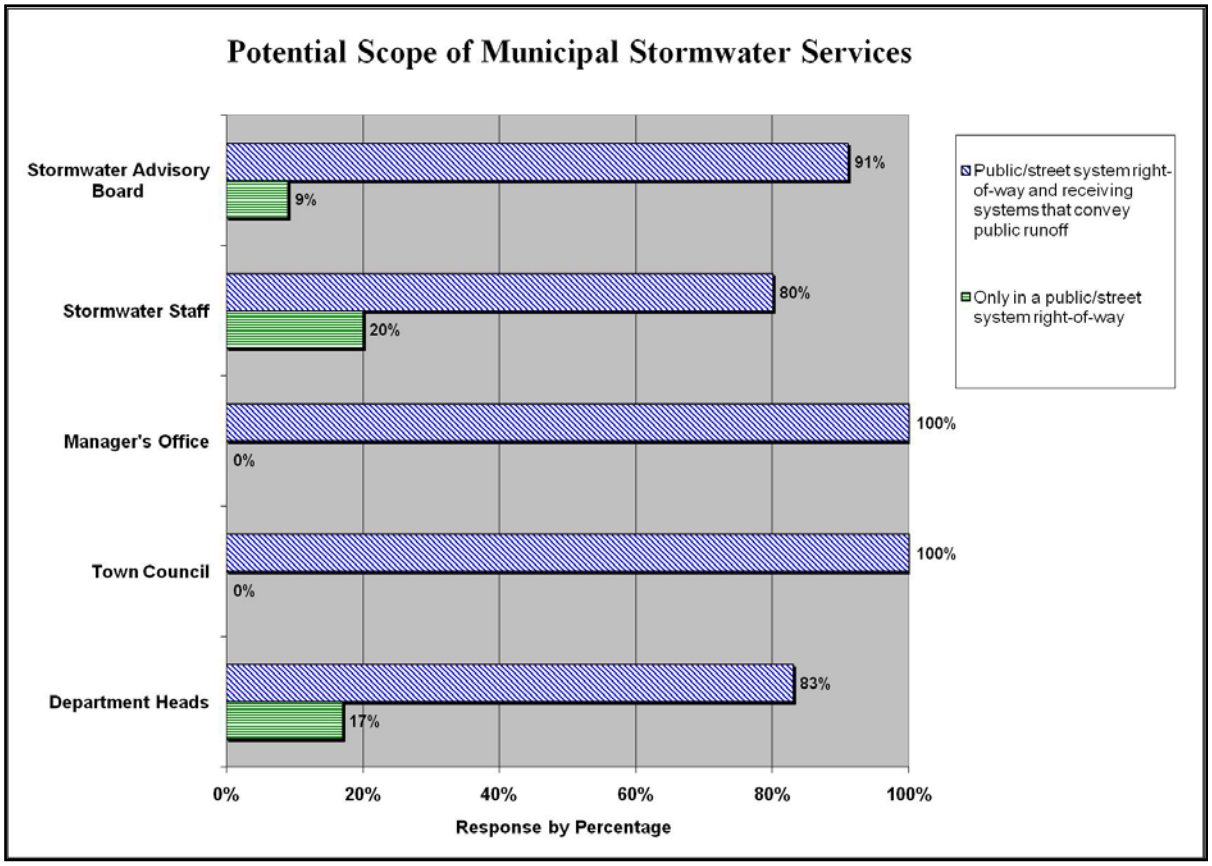


Figure 16 – Broad Support for Complete Public System Management

Representative comments from experienced stakeholders close to the Town's Stormwater Program that further characterize and explain the recommendation to move towards prioritized management of the *stormwater system* include the following:

- ***"The stormwater system needs to be looked at as a whole."***
- ***"We created the problems through a lack of policy direction for so long that it may be necessary to work with property owners to correct problems."***
- ***"Need to treat entire system rather than only part of a system."***
- ***"It is a system, not individual pieces."***
- ***"Because they pay a stormwater fee, citizens would expect some level of service beyond (street) right of ways."***
- ***"Systems need to be treated as a whole, and especially in troublesome areas on private property, the right of way has some impact, whether small or large."***
- ***"The storm sewer networks running through Town were designed without regard to ownership, thus any given network will drain right of way, cross and drain private property, then cross and drain right of way, etc. What happens in the privately-owned sections strongly affects what happens in the publicly-owned sections, and vice versa."***
- ***"Piecemeal management of parts of the system that are concurrent with the right of way betrays the fundamental nature of hydrology."***
- ***"Very limited, only with dedicated easements and defined policies."***
- ***"The Town's drainage assistance program should be expanded and funded to allow more cost-sharing small improvement projects that involve public stormwater affecting private property."***
- ***"Public money should firstly be spent on public facilities before private improvements."***
- ***"Seems that if it is going to work at all, it needs to be a Town-wide effort."***
- ***"Through cooperation with land owners only."***
- ***"It's all connected. It doesn't make sense to tax and subdivide the system that produces and transports runoff."***
- ***"Approach limited only to right of way areas results in too much reliance on non-public compliance."***
- ***"The Town needs to be sure the whole drainage system works properly."***
- ***"Public policy decision."***

Program Funding and Preliminary Benchmarking Analysis

How does Chapel Hill's stormwater program funding compare to funding for other municipal stormwater utilities in North Carolina? This section provides a preliminary benchmarking analysis of Chapel Hill's stormwater program relative other programs in North Carolina. Future phases of the master plan may extend the scope to well-regarded programs in other states for a national perspective on where Chapel Hill's program stands. Results indicate that Chapel Hill's overall stormwater utility funding and staffing level is about average with other programs in the state.

The JEWELL Team was asked by the UNC School of Government Environmental Finance Center (EFC) in May/June 2007 to volunteer a survey and analysis of 17 municipal stormwater utilities in North Carolina including Chapel Hill. All of the six Phase I NPDES municipalities participated in the survey along with 11 Phase II programs. Summary results of the NC Municipal Stormwater Utility Survey for FY 06/07 are shown in Table 16, with complete results provided in Appendix 6.

Table 16 – FY 06/07 Results from 2007 NC Municipal Stormwater Utility Survey

Summary Analysis for Fiscal Year 2006 - 2007					
JEWELL ENGINEERING CONSULTANTS, PC / UNC ENVIRONMENTAL FINANCE CENTER	Participating NPDES Phase Is:	Charlotte, Raleigh, Greensboro, Durham, Winston-Salem, Fayetteville			
	Participating NPDES Phase IIs:	Wilson, Concord, Rocky Mount, Asheville, Chapel Hill, Wilmington, Clemmons Gastonia, High Point, Greenville, Kernersville			
Survey:	**MEAN**	**MEDIAN**	**LOW**	**HIGH**	**STD DEV**
Total jurisdictional area served by stormwater utility (in square miles)	76.0	51.0	12.0	280.5	67.9
Total population served by stormwater utility	148,525	72,231	16,045	651,101	160,171
Total Annual Budgeted Stormwater Revenue ($)	$5,832,581	$2,722,187	$502,000	$34,800,000	$8,337,087
Average Single-Family Residential fee rate ($/month)	$3.60	$3.50	$1.00	$7.06	$1.66
Equivalent Residential Unit, ERU (in square feet)	2,601	2,543	2,000	3,952	481
Maximum potential fee credit (%)	68	68	40	100	26
Number of utility customers participating in fee crediting program	66	28	1	250	96
Budgeted Annual Expenditures (as % of total budgeted revenue) by major program function:					
Administration (program management, utility & billing administration, general administrative costs)	12	10	3	27	7
NPDES/Water Quality (NPDES, TMDL, Basinwide water quality rules, watershed protection, etc.)	12	6	3	33	12
Planning & Engineering (Master planning, inventory, engineering, plan review, etc.)	10	8	1	21	7
Public Education & Outreach	2	2	1	7	2
Drainage System Operation & Maintenance (MS4 O&M, street sweeping, & related SW maintenance)	34	34	13	52	12
Capital Improvement Program (CIP)	28	27	7	69	20
Other (inspections and enforcement, etc.), if applicable	3	3	2	4	1
Debt Service, if applicable	6	5	0	17	7
Fund Reserve, if applicable	8	8	5	10	3
Total of Budgeted Expenditures by Program Area (~ 100%)	100	100	100	100	0
What is the approximate current Fund Balance ($) for the Stormwater Utility Fund?	$4,529,432	$1,241,803	$302,316	$20,000,000	$7,693,142
Total Full-Time Equivalent (FTE) positions supported by the Stormwater Utility Fund	38	30	6	90	30
FTEs by major stormwater program area or program function:					
Administration/Program Management	4	2	1	15	5
Public Education	1	1	1	2	0
Water Quality	3	3	1	10	3
Planning & Engineering	6	2	0	21	8
Drainage System Operation & Maintenance	26	23	2	60	21
Other (Inspections, etc.)	3	1	1	9	5
Summary Analysis for Fiscal Year 2006 - 2007:	**MEAN**	**MEDIAN**	**LOW**	**HIGH**	**STD DEV**
Annual Revenue per Square Mile of Service Area ($/sq mi)	$73,510	$67,294	$16,800	$124,064	$34,559
Annual Revenue per Acre of Service Area ($/ac)	$114.86	$105.15	$26.25	$193.85	$54.00
Annual Revenue per Person Served ($/person)	$40.91	$35.25	$11.05	$77.20	$16.96
Avg. Monthly Fee Rate per 1,000 square feet of impervious area ($/1,000 sq ft)	$1.41	$1.14	$0.39	$3.25	$0.78
Avg. Monthly Fee Rate per acre of impervious area ($/acre)	$61.37	$49.54	$16.83	$141.57	$33.80
Approx. Annual Expenditures ($) per Square Mile by Major Program:					
Administration	$7,193	$5,642	$1,344	$15,046	$4,016
Water Quality	$6,358	$4,520	$1,103	$14,828	$4,582
Planning & Engineering	$6,495	$4,908	$473	$15,982	$5,264
Public Education	$1,609	$934	$567	$5,301	$1,520
System Operation & Maintenance	$25,208	$23,777	$4,779	$55,038	$15,861
Capital Improvement Program (CIP)	$20,066	$15,549	$2,688	$46,679	$16,533
Other (Inspections, etc.)	$2,803	$2,803	$1,871	$3,734	$1,318
Debt Service, if applicable (typically used for capital programs)	$13,750	$14,358	$5,802	$21,091	$7,662
Fund Reserve	$4,430	$4,430	$4,132	$4,728	$422
Total FTEs (funded by utility) per Square Mile of Service Area	0.521	0.411	0.185	1.157	0.313
Total FTEs (funded by utility) per Thousand Persons Served	0.297	0.257	0.105	0.740	0.183

As preliminary benchmarking of Chapel Hill's Stormwater Management Utility to other municipal stormwater utilities in North Carolina, Table 17 shows actual budgeted stormwater program funding and staffing levels for Chapel Hill (FY 06/07) vs. hypothetical figures for Chapel Hill based on statewide municipal utility statistics. For example, Chapel Hill's actual budgeted revenue in FY 06/07 was $1,644,927. The mean annual revenue, on a jurisdictional area basis using statewide utility statistics, would be projected as $1,551,059, with a low of $354,480 and a high of $2,617,754. The mean annual revenue, on a per capita basis using statewide utility statistics, would be projected as $2,143,543, with a low of $579,125 and a high of $4,045,034.

Table 17 – Comparison of Chapel Hill's Stormwater Utility to Statistics for NC Municipal Utilities

	STATEWIDE STATISTICS APPLIED TO CHAPEL HILL (FY 06/07)				
	MEAN	**MEDIAN**	**LOW**	**HIGH**	**FY 06/07 ACTUAL BUDGET for Chapel Hill, NC**
Total Annual Revenue (on jurisdictional area basis)	$1,551,059	$1,419,911	$354,480	$2,617,754	**$1,644,927**
Total Annual Revenue (on per capita basis)	$2,143,543	$1,847,135	$579,125	$4,045,034	**$1,644,927**
Avg. Monthly Fee Rate per 2,000 square feet of impervious area	$2.82	$2.27	$0.77	$6.50	**$3.25**
Approx. Annual Expenditures ($) by Major Program (area basis)					
Administration	$151,779	$119,037	$28,358	$317,471	**$317,071**
Water Quality	$134,158	$95,379	$23,272	$312,867	**$101,291**
Planning & Engineering	$137,052	$103,567	$9,976	$337,210	**$336,835**
Public Education	$33,944	$19,699	$11,971	$111,855	**$112,091**
System Operation & Maintenance	$531,881	$501,703	$100,846	$1,161,304	**$500,989**
Capital Improvement Program (CIP)	$423,384	$328,093	$56,717	$984,929	**$150,000**
Other (Inspections, etc.)	$59,136	$59,136	$39,478	$78,794	**$40,000**
Debt Service, if applicable (typically used for capital programs)	$290,131	$302,949	$122,426	$445,018	**$0**
Fund Reserve	$93,470	$93,470	$87,181	$99,759	**$86,650**
Total FTEs (funded by utility, on jurisdicational area basis)	11.0	8.7	3.9	24.4	**13.45**
Total FTEs (funded by utility, per capita basis)	15.6	13.5	5.5	38.8	**13.45**

Recommended Measures of Success for Town Stormwater Program

What specific measures will help define success for the Town of Chapel Hill Stormwater Management Program?

While development of final performance measures and targets is within proposed Phases 2 and 3 of the master plan project, the first phase sought feedback from key stakeholders on a broad range of potential balanced measures for the master plan and program implementation.

Questions that have and will arise relatively early in the life of Chapel Hill's municipal stormwater utility include, for examples:

- How has the stormwater utility program improved water quality and reduced flooding in local waterways?
- What is the Town doing with stormwater revenues? What stormwater programs and services are being provided and to what extent and level?
- Is the stormwater utility program worth its cost or is there a need to increase revenues and expenditures to better address identified needs?

These and related questions are healthy and important for any new (and ongoing) stormwater utility organization to address. Is the stormwater program, in fact, beginning to positively affect receiving water quality? Are flood hazards being mitigated? Are outdated drainage systems being repaired or replaced? Is community awareness of water pollution and ways to help increasing? Are utility staff and teams growing professionally and making contributions? Are limited utility funds being spent on the most important public projects?

As introduced in Section 1, the Town proposes to apply concepts from Kaplan and Norton's *Balanced Scorecard* to develop an appropriate range of measures to track the success of its stormwater program. Equally fitting to progressive governmental, non-profit, and for-profit organizations, the four broad perspectives endorsed for *Balanced Scorecard* applications include: 1) financial / budgetary, 2) customer / public, 3) internal processes, and 4) learning and growth. For Chapel Hill's stormwater utility, the four broad perspectives effectively means 1) to manage fiscal resources, 2) to serve utility customers and the local public, 3) run the utility to deliver required stormwater programs and services, and 4) recruit, develop, train, and retain employees to accomplish the organizational mission.

The Town does not advocate developing a "laundry list" of things to measure for their own sake. Instead, it will be important to continue to work with Chapel Hill staff and stakeholders to identify performance measures that relate to the adopted mission, goals, objectives, and specific programs and services of the utility, that provide insights on organizational processes and internal effectiveness, and that help characterize how rate-paying citizens view the program. Thus, balanced measures must be reflective of utility outcomes and performance from both external and internal perspectives. Of course, the Town's stormwater program measures must document compliance with regulatory mandates, at a minimum – such items as illicit discharges identified and removed, fulfillment of construction site controls, level of public participation, post-construction stormwater controls, upcoming nutrient control standards, etc.

Drawing upon Kaplan and Norton's Balanced Scorecard ideas, strategic measures for the stormwater program will also be a combination of "leading" indicators and "lagging" indicators. Most traditional measures of success have focused on "lag" measures such as financial performance. From the public stormwater perspective, water quality sampling results would also be considered "lag" indicators because they represent actual results achieved. In this sense, water quality monitoring results are analogous to end of period financial results.

Lead indicators for the Town's stormwater program success could include such items as level of staff training and development, number and frequency of volunteer efforts in the community, level of watershed and sub-watershed planning completed to help prescribe stormwater control and mitigation requirements, level of participants in the future utility fee-crediting program demonstrating private control of stormwater, status of structural BMP inspections and maintenance, and so on – things that, if done, help promote protection and improvement of water quality in receiving waters, for example.

Table 18 contains stakeholder group composite results regarding the relative importance (i.e., high, medium, or low) of a range of potential measures or key performance indicators for the Chapel Hill Stormwater Management Program. These will be reviewed, further defined, and expanded as appropriate in later phases of the master plan development. The preliminary list contains measures that cover each of the four broad strategic perspectives endorsed within a balanced scorecard framework.

Upon completion, concepts from the balanced scorecard system for Chapel Hill's stormwater utility will link each key activity, program, and service to an appropriate range of performance targets and measures. Each employee will also have an individual "scorecard" for the specific components of their job that provides a direct tie into an overall "utility-wide" scorecard. A satisfying organizational scenario promoting both teamwork and individual success, stormwater team members will understand how they contribute directly and substantially to accomplishment of the Town's stormwater program mission and vision.

Table 18 – Preliminary Measures/Key Performance Indicators for Chapel Hill's Stormwater Management Program

Measures or Key Performance Indicators	Composite			
	High	Medium	Low	Don't Know
Water quality for receiving streams and lakes in Chapel Hill	91.5%	8.5%	0.0%	0.0%
Compliance with state and federal regulations	75.8%	22.0%	2.3%	0.0%
Reduced flood hazards and flood-related problems	75.8%	24.3%	0.0%	0.0%
Linear feet of degraded streams stabilized and/or restored	62.0%	38.0%	0.0%	0.0%
Water quality in the Upper New Hope Arm of Jordan Lake	47.3%	50.5%	2.3%	0.0%
Volume of trash & sediment removed from streets and MS4	43.5%	49.3%	7.3%	0.0%
Development, implementation, tracking, and updating of the Master Plan	43.3%	25.5%	31.3%	0.0%
# sites developed or redeveloped using low impact stormwater practices	41.0%	50.5%	8.5%	0.0%
Budgeted v. actual expenditures and other financial performance measures	38.3%	50.8%	10.8%	0.0%
# enforcment actions taken to reduce and eliminate pollution	26.3%	55.0%	18.8%	0.0%
# drainage and pollution complaints received, responded to, and resolved	26.3%	46.5%	27.3%	0.0%
# stormwater billing complaints received, responded to, and resolved	22.3%	31.8%	46.0%	0.0%
Regular surveys of customer awareness and satisfaction	20.5%	55.0%	24.5%	0.0%
# stormwater capital improvement & drainage assistance projects completed	17.8%	71.5%	10.8%	0.0%
Level of support and involvement from external and regional stakeholders	16.3%	72.5%	11.3%	0.0%
# volunteers involved in stormwater programs	12.5%	41.5%	46.0%	0.0%
Professional development and training programs completed by staff	6.8%	38.8%	54.5%	0.0%
Composite	39.2%	43.0%	17.7%	0.0%

Next Steps in Master Plan Development and Implementation

Building upon the foundation established in the first phase of the Master Plan development, the second phase will involve the following key components:

- Providing technical support to Town Staff in further review and assessment of the proposed Jordan Lake Nutrient Management Strategy relative to impacts upon Chapel Hill
- Completing the stormwater Capital Improvement Project (CIP) rating system and applying it to help prioritize and implement known projects
- Updating the rating system for the Drainage Assistance Program (DAP) to align with the criteria and procedures in the CIP rating system
- Developing an updated stormwater utility program fee rate study and cost of service analysis that takes into account developing strategic issues from the master plan
- Developing recommendations for a stormwater utility fee crediting policy and program

- Identifying an appropriate pilot sub-watershed within Chapel Hill to begin the detailed watershed modeling and planning process, the results of which will be applied systematically on a future prioritized basis across all of the Town's sub-watersheds and planning areas

- Continuing to build the comprehensive *Stormwater Management Program Master Plan* through public workshops, workshops with the Stormwater Advisory Board, and the Stormwater Staff.

Appendix 1

Chapel Hill Stormwater Management Utility Ordinance

CHAPTER 23 - ARTICLE I. STORMWATER MANAGEMENT UTILITY

Sec. 23-1. Findings.
The council does hereby find that:

(1) North Carolina General Statute Chapter 160A, Article 16 authorizes the town to acquire, construct, establish, enlarge, improve, maintain, own, operate, and contract for the operation of stormwater management programs designed to protect water quality by controlling the level of pollutants in, and the quantity and flow of, stormwater and structural and natural stormwater and drainage systems of all types.

(2) The establishment, by town ordinance, of a stormwater management utility that shall be accounted for as a separate enterprise fund and will facilitate the provision of a stormwater management program.

(3) North Carolina General Statute Sec. 160A-314 authorizes the Town of Chapel Hill to establish and revise from time to time a schedule of rates and charges to fund the stormwater management program activities including both structural and natural stormwater conveyance and drainage system services provided by the stormwater management utility.
(Ord. No. 2004-06-14/O-9, § 1)

Sec. 23-2. Purpose.

This article establishes a stormwater management utility as an identified fiscal and accounting fund for the purpose of comprehensively addressing the stormwater management needs of the town through programs designed to protect and manage water quality and quantity by controlling the level of pollutants in stormwater runoff, and the quantity and rate of stormwater received and conveyed by structural and natural stormwater and drainage systems of all types. It sets forth a schedule of charges and defines the control, collection, and disbursal of funds including penalties, appeals, exemptions and credits.
(Ord. No. 2004-06-14/O-9, § 1)

Sec. 23-3. Definitions.

For the purpose of this article, the following words, terms, and phrases shall have the meanings given to them in this section, except where the context clearly indicates a different meaning:

Credits shall mean ongoing reductions in the stormwater management service charge applicable to a given zoning lot or tract in recognition of on-site or off-site systems, facilities, measures, and/or actions undertaken to reduce or mitigate the stormwater quantity and/or

quality impact(s) of the zoning lot or tract that would otherwise impact the public stormwater management system. Credits shall be conditioned on the continuing performance of the mitigation systems, facilities, measures, or actions in reference to standards adopted by the stormwater management utility, and may be revised or rescinded for cause. In no case shall credits exceed the amount of the stormwater management service charge. The means and measures for identifying, issuing and obtaining credits will be provided in a credit manual approved by the town council.

Customer shall mean the person or entity to which the stormwater fee is billed.

Developed land shall mean a zoning lot or tract altered from its natural state to include impervious surface area equal to or greater than 200 square feet.

Drainage system shall mean natural and structural channels, swales, ditches, swamps, rivers, streams, creeks, wetlands, branches, reservoirs, ponds, drainage ways, inlets, catch basins, gutters, pipes, culverts, bridges, head walls, storm sewers, lakes, and other physical works, properties, and improvements that transfer, control, convey or otherwise influence the movement of stormwater runoff.

Easement shall mean a grant of rights by a property owner to a portion of land for a specified purpose as defined in a recorded deed, as delineated on a recorded plat, or as established in another legal document.

Equivalent rate unit (ERU) shall mean two thousand (2,000) square feet of impervious surface or fraction thereof.

Governmental unit shall mean a city, county, school administrative unit, sanitary district, fire district, the state, or any other public district, authority, department, agency, board, commission, or institution.

Impervious surface area shall mean developed areas of land that prevent or significantly impede the infiltration of stormwater into the soil. Typical impervious surface areas include, but are not limited to: roofs, sidewalks, walkways, patios, swimming pools, private driveways, parking lots, access extensions, alleys and other paved, engineered, compacted or gravel surfaces containing materials that prevent or significantly impede the natural infiltration of stormwater into the soil.

Lot shall mean land bounded by lines legally established for the purpose of property division. As used in this chapter, unless the context indicates otherwise, the term refers to a zoning lot.

Natural state shall describe existing undeveloped land where the soil and vegetation characteristics that have not been substantially modified or disturbed by human activities and the hydrologic function is in an unaltered or natural condition.

Owner shall mean the legal or beneficial owner of land, as shown in the county land records.

Person shall mean any person, firm, partnership, association, corporation, company, governmental unit or organization of any kind.

Real property shall mean land, tenements, and hereditaments.

Service area shall mean all land within the corporate limits of the town, including all land areas legally annexed thereto.

Service charge shall mean a stormwater management service charge, applicable to a zoning lot or tract, that generally reflects the impact on or demand for stormwater management services provided by the town to properly control and manage stormwater runoff quantity and/or quality associated with the zoning lot or tract. The service charge will vary from one zoning lot or tract to another, based on the impervious surface area.

Stormwater shall mean the runoff from precipitation that travels over natural state or developed land surfaces and enters a drainage system.

Stormwater management program shall mean an identified set of measures and activities designed to protect, restore and/or manage stormwater quality by controlling and/or reducing pollutants and; to reduce and/or manage stormwater quantity by controlling velocity, volume, and rate.

Stormwater management utility shall mean an organizational structure that is responsible for funding, administering, and operating the town's stormwater management program, and that is supported through a rate structure based on the impervious surface area found on zoning lots or tracts located within the service area.

Tract shall mean a parcel of land not previously recorded as a zoning lot.

Undeveloped land shall mean all land that is not altered from its natural state to an extent that results in two hundred (200) or more square feet of impervious surface area.

Zoning lot shall mean a legally subdivided lot (not a tract) shown on a legally recorded plat or deed, or a combination of such legally subdivided and recorded adjacent lots.
(Ord. No. 2004-06-14/O-9, § 1; Ord. No. 2005-03-07/O-8, § 1)

Sec. 23-4. Establishment of a stormwater management utility and stormwater management enterprise fund.

(a) There is hereby established a town stormwater management utility that shall be responsible for implementing, operating, and administering the town's stormwater management program as defined herein.

(b) There is hereby established a town stormwater management enterprise fund for the purpose of dedicating and protecting funding applicable to the responsibilities of the stormwater management utility including but not limited to, rents, rates, fees, charges, and penalties as may be established, after due notice and a public hearing by the town council. Funding may also include other funds transferred or allocated to the stormwater management utility by the town council. All revenues and receipts of the stormwater management utility shall be placed in the stormwater management enterprise fund and all expenses of the utility shall be paid from the stormwater management enterprise fund, except that other revenues, receipts, and resources not accounted for in the stormwater management enterprise fund may be applied to stormwater management activities as deemed appropriate by the town council.
(Ord. No. 2004-06-14/O-9, § 1)

Sec. 23-5. Jurisdiction.

The jurisdiction (service area) of the stormwater management utility shall extend to the corporate limits of the town, including all areas legally annexed thereto.
(Ord. No. 2004-06-14/O-9, § 1)

Sec. 23-6. Impervious service area and equivalent rate unit.

(a) Impervious surface area on a given zoning lot or tract directly relates to the volume, rate and pollutant loading of stormwater runoff discharged from that zoning lot or tract to the town's structural and natural drainage systems and facilities. Therefore, impervious surface area shall be the primary parameter for establishing a rate structure to distribute the cost of services associated with the operation, repair, improvement and maintenance of public drainage systems and facilities through a schedule of rates, fees, charges, and penalties related to the operation of a stormwater management utility and stormwater management enterprise fund as established in section 23-4.

(b) Based on an analysis by the town of impervious surface area on properties throughout the town, an impervious surface area of two thousand (2,000) square feet shall be designated as one (1) equivalent rate unit (ERU)
(Ord. No. 2004-06-14/O-9, § 1)

Sec. 23-7. Schedule of fees and charges.

(a) The schedule of fees and charges set out in this section is hereby adopted and shall apply to all zoning lots and tracts within the corporate limits of the town, except as may be altered by credits or exemptions provided in this article.

(1) The person who is the owner of record on January 1 of each year of each zoning lots and tract within the corporate limits of the town, shall be billed one (1) equivalent rate unit for each two thousand (2,000) square feet or fraction thereof of impervious surface area on the subject zoning lot or tract, except as noted in section 23-8, below.

(2) The first year service charge per equivalent rate unit shall be thirty-nine dollars ($39.00).

(3) Thereafter, the service charge per equivalent rate unit shall be thirty-nine dollars ($39.00) per calendar year. The fees charged under this section are intended for the fiscal year in which the fees become due.

(b) There will be no service charge for zoning lots or tracts with fewer than two hundred (200) square feet of impervious surface area.
(Ord. No. 2004-06-14/O-9, § 1; Ord. No. 2005-03-07/O-8, § 2)

Sec. 23-8. Billing and collection.

(a) *Method of billing.* Billing and collection of the stormwater management utility service charges and any penalties for stormwater management services and facilities shall be administered by the town manager. Additional guidelines concerning billing may be developed by the town manager.

(b) Townhouse, condominium, and similar developments containing impervious surface area in common and individual ownership. The stormwater fee for townhouse and condominium developments and other similar developments containing impervious surface area in common and individual ownership shall be based on the total impervious surface area of all commonly-owned and individually-owned real property within the development. The total stormwater fee for the entire development is divided by the number of units to calculate the fee for each unit. The stormwater fee shall be sent to each unit owner unless the owners' association has requested one of the fee redistribution options below. The billing option(s) described in this subsection (b) and in subsection (c) below shall not apply to a detached single-family house, a duplex, or a manufactured home or mobile home located on an individual lot rather than in a manufactured home or mobile home park. Billing options listed herein may not all be available in some cases depending on the legal structure of ownership.

(c) *Fee redistribution.* Upon official request of an owners' association reflecting a vote in accordance with the association's bylaws, the stormwater fee for townhouse and condominium developments may be redistributed using one of the options listed below. A request for fee redistribution shall contain all the information required by the town and shall be binding for the period of time specified by the town. Approved fee redistribution requests shall become effective in the following billing year.

(1) Consolidated billing to the owners' association or designated agent. The stormwater fee shall be based on the total impervious surface area of all commonly-owned and individually-owned real property within the development and a single bill shall be sent to either the owners' association or designated agent.

(2) Shared billing between unit owners and the owners' association or designated agent.

i. The stormwater fee for the impervious surface area on commonly-owned real property shall be calculated and billed to the owners' association or designated agent. The remaining impervious surface area contained on individually-owned real property(ies) is summed; the total stormwater fee is calculated and then divided by the total number of units; and the stormwater fee for each unit shall be sent to the unit owner; or

ii. The stormwater fee for the impervious surface area on commonly-owned real property shall be calculated and billed to the owners' association or designated agent. The stormwater fee for the impervious surface area contained on individually-owned real property is calculated and sent to the property owner.

(3) Proportional billing to unit owners. The stormwater fee shall be based on the total impervious surface area on all commonly-owned and individually-owned real property within the development. The total stormwater fee for the entire development is divided proportionally among the units, based on each unit's interior floor area as a percentage of the total interior floor area within the development as a whole. The stormwater fee for each unit shall be sent to the unit owner.

(d) *Easements.* Stormwater fees for impervious surface area contained within an easement outside a public street or highway shall be billed to the person or entity responsible for the construction and maintenance of the impervious surfaces within the easement.

(e) *Delinquencies.* Stormwater management utility service charge billings associated with the stormwater management utility are due and payable on September 1 of the fiscal year for which the fees are charged. Stormwater fees shall be declared delinquent if not paid on or before January 5 of the year following the year that billings are issued. Delinquent billings shall accumulate additional penalties at the rate of two (2) percent for the month of January, and three-fourths (3/4) of one (1) percent for each month thereafter. This penalty shall be termed a delinquent payment penalty charge. The town manager shall have discretionary authority with regard to the assessment of penalties and the time allowed for appeals when situations such as billing errors, incorrect addresses, or processing delays warrant relief in the opinion of the manager.

(f) *Appeal of disputed bills and adjustments.* If any customer wishes to dispute a stormwater utility service charge billing or penalties adopted pursuant to this article, that customer must submit a written appeal within ninety (90) days of the billing, stating the reasons for the appeal, and providing information pertinent to the calculation of the billed charge. A timely appeal shall stay the penalty deadlines. An appeal of a disputed bill shall be filed with the town's stormwater manager for review and disposition. If the customer is not satisfied with the disposition of the appeal, the customer may further appeal the disputed charge to the town manager or his designee who shall make the final ruling on the validity of the appeal.

(g) *Collection of delinquencies:* The administrative remedies provided in this chapter shall be exhausted before recourse to a court of competent jurisdiction.

(Ord. No. 2004-06-14/O-9, § 1; Ord. No. 2005-03-07/O-8, § 3)

Sec. 23-9. Disposition of service charges and fees.

Stormwater management utility service charge and fee revenues shall be assigned and dedicated solely to the stormwater management enterprise fund in the town budget and accounting system, which shall be and remain separate from other funds, and shall be used only to fund identified stormwater management program activities. The services charges and fees paid to and collected by virtue of the provision of this article shall not be used for general or other governmental or proprietary purposes of the town, except to pay for costs incurred by the town in rendering services associated with the stormwater management utility.
(Ord. No. 2004-06-14/O-9, § 1)

Sec. 23-10. Credits and exemptions.

(a) *Credits.* Credits against stormwater management utility service charges are an appropriate means of adjusting fees, rates, rentals, charges, fines, and penalties, under some circumstances, to account for applicable mitigation measures. Credit mechanisms may be established by the town council and, if established, the means and measures for identifying, issuing and obtaining credits will be provided in a credit manual approved by the town council. No exception, credit, offset, or other reduction in stormwater management service charges shall be granted based on age, race, tax status, economic status, or religion of the customer, or other condition unrelated to the demand for and cost of services provided by the stormwater management utility.

(b) *Exemptions.* Except as provided in this article, no public or private property shall be exempt from stormwater management utility service charges, with the following exceptions:

(1) Public road rights-of-way that have been conveyed to and accepted for maintenance by the North Carolina Department of Transportation, and that are available for use by the general public for transportation purposes, shall be exempt from town stormwater management utility service charges.

(2) Public road rights-of-way that have been conveyed to and accepted for maintenance by the Town of Chapel Hill, and that are available for use by the general pubic for transportation purposes, shall be exempt from town stormwater management utility service charges.

(3) Railroad rights-of-way used for trackage and related appurtenances shall be exempt from town stormwater management utility service charges.
(Ord. No. 2004-06-14/O-9, § 1)

Sec. 23-11. Establishment of a stormwater management utility advisory board.

A Town of Chapel Hill Stormwater Management Utility Advisory Board is hereby established.
(Ord. No. 2004-06-14/O-9, § 1)

Sec. 23-12. Membership qualifications and terms.

The stormwater management utility advisory board shall consist of eleven (11) members appointed by the town council. Board representation shall include six (6) members who are owners of single-family residential property within Chapel Hill, four (4) members who are owners or employees of companies owning property within Chapel Hill used for multi-family, business, commercial, or non-profit purposes, and one (1) member employed by the University of North Carolina at Chapel Hill.

The terms of board members shall be a maximum of three (3) years. The terms of the original members may be staggered so that all terms do not expire simultaneously. Vacancies shall be filled only for the remainder of the unexpired term of the vacant position. Members of the board shall demonstrate interest in support for the efficiency, effectiveness, goals and mission of the town's stormwater management program. Board members shall serve without compensation, but may be reimbursed for actual expenses incidental to the performance of their duties within the limit of funds available to the board and identified by the town council for such purposes.
(Ord. No. 2004-06-14/O-9, § 1; Ord. No. 2004-12-06/O-5, § 1)

Sec. 23-13. Officers.

The board shall elect one member to serve as chair and to preside over its meetings, and shall create and fill such offices and committees as it may deem necessary. The term of the chair and other officers shall be one (1) year, with eligibility for re-election to a second term. The chair or any member acting as chair is authorized to administer oaths to witnesses coming before the board.
(Ord. No. 2004-06-14/O-9, § 1)

Sec. 23-14. Charge and responsibilities of the board.

The stormwater management utility advisory board is herewith charged with the following responsibilities:

(1) Provide recommendations regarding the identification and implementation of new stormwater management program activities.

(2) Review and provide recommendations on the stormwater management program master plan.

(3) Provide recommendations concerning gaps or inconsistencies in town stormwater management services, facilities, programs, policies, and regulations and recommend improvement alternatives.

(4) Provide recommendations for priorities and scheduling of watershed master planning and development of drainage basin plans.

(5) Assist town staff in working with stakeholder groups to implement program objectives and activities.

(6) Assist town staff with public education and outreach activities that promote the town's stormwater management program.

(7) Assist town staff in meeting the mission and achieving the identified goals and objectives of the town's stormwater management program.

(8) Provide recommendations for internal program evaluation and reporting mechanisms, and assist town staff in periodically reporting to the town council on program effectiveness.
(Ord. No. 2004-06-14/O-9, § 1)

Sec. 23-15. Meetings.

The board shall establish a regular meeting schedule and shall meet at least quarterly.
All board meetings shall be open to the public, and reasonable notice of the time and place thereof shall be given in accordance with Chapter 143, Article 33C of the North Carolina General Statutes. The board shall keep a record of its meetings, including attendance of its members, and its resolutions, findings, recommendations, and actions.
(Ord. No. 2004-06-14/O-9, § 1)

Sec. 23-16. Meeting attendance.

Any member of the board who misses more than three (3) consecutive meetings shall lose his or her status as a member of the board, and shall be replaced or reappointed by the council. Absence due to sickness, death, or other emergencies of like nature shall be recognized as excused absences, and shall not affect the member's status on the board, except that in the event of a long illness or other such cause for prolonged absence, the member shall be replaced.
(Ord. No. 2004-06-14/O-9, § 1)

Sec. 23-17. Quorum and voting.

A quorum of the board shall consist of a simple majority. The vote of a simple majority of those present at a meeting, a quorum being present, shall be necessary to take any official board action.
(Ord. No. 2004-06-14/O-9, § 1; Ord. No. 2005-01-10/O-3, § 1)
Secs. 23-18--23-23. Reserved.

Appendix 2 - Chapel Hill Stormwater Data Inventory
GIS & Other Data Inventory (Updated as of July 2007)

Category	Description	Filename or Feature Class Name	Extent	File Type	Data Source	Data Location	Metadata	Common Uses	Update Frequency	Update Data Source	Display Layer(s)	# of Records	# of Attributes	Date	Comments
Aerials	Durham 2002 Aerials	17spv#.tif (5 files)	western Durham county	raster - TIF	Durham City GIS	Chgis3	no	stormwater billing	?	Durham GIS	None	---	---	2002	Aerials for small portion of Durham
	Raleigh/Durham Aerial Index	raleigh_index_01	?	shapefile - polygon		Chgis3	no		not updated		None	1126	15		
	Orange County Aerial Grid Index	aerial_grid_index	southern Orange county	shapefile - polygon	CH-Engineering	Chgis3	no	use with aerials	not updated		aerial_grid_index	551	9		Grid index for use with chapel hill aerials that haven't been merged into one Mr. SID
	Chapel Hill 2000 Aerials	(numbered by grid index - multiple files)	southern Orange county	raster - MRSID	CH-Engineering	Chgis3	no	drainage assistance, stormwater billing, general cartography	5 years?	contractor	None	---	---	2000	
	Merged Townwide Aerials	aerial_townwide	southern Orange county	raster - MRSID		Chgis3	no		5 years?	contractor					Possibly lower resolution than individual grid aerials? Not sure.
	also 1999 Durham aerials and 1998 Orange aerials	(several files)	western Durham county	raster - TIF and MRSID	Durham City GIS & Orange County	Chgis3	no		not updated	N/A					
Elevation	Chapel Hill Digital 10-ft Elevation Model	chdem90	Town and beyond	raster - DEM	CH-Stormwater	Chgis3	no	general cartography, watershed planning	?	contractor?	elevation_color_ramp	---	---	1990	
	Chapel Hill 2 ft Elevation Contours	topo2004_town2ft	Town and beyond	shapefile - polyline	CH-Engineering	Chgis3	no	stream determinations, RCD, watershed planning, illicit discharge, stormsewer inventory	5 years?	contractor		193932	10	2004	Note that this is actually the corrected data done in 2005, 2004 file just overwritten to avoid broken data links in ArcMap
	Chapel Hill 10 ft Elevation Contours	topo2004_town10ft	Town and beyond	shapefile - polyline	CH-Stormwater	Chgis3	no	stream determinations, RCD, watershed planning, illicit discharge, stormsewer inventory	5 years?	derived from 2ft contours	None	54776	10	2004	Extracted from 2 ft contour layer
	Chatham County Digital Elevation Model	chathamdem	Chatham county	raster - DEM	USGS	Chgis3	no		?	USGS					
	Orange County Digital Elevation Model	orangedem	Orange county	raster - DEM	USGS	Chgis3	no		?	USGS					
	Durham County Digital Elevation Model	durhamdem	Durham county	raster - DEM	USGS	Chgis3	no		?	USGS					
	Wake County Digital Elevation Model	wakedem	Wake county	raster - DEM	USGS	Chgis3	no		?	USGS					
	Durham County 10-foot Elevation Contours	topo_durham10ft	Durham county	shapefile - polyline	Durham City GIS	Chgis3	no		?	Durham City GIS					
	Durham County 2-foot Elevation Contours	topo_durham2ft	Durham county	shapefile - polyline	Durham City GIS	Chgis3	no		?	Durham City GIS					
	Chapel Hill - Carrboro 2004 2-foot Elevation Contours	topo_orange2ft	Chapel Hill and Carrboro	shapefile - polyline	Orange County Land Records	Chgis3	no		5 years?	contractor					
	Orange County 2004 5 -foot Elevation Contours (outside of Carrboro-Chapel Hill)	topo_orange5ft	Orange county	shapefile - polyline	Orange County Land Records	Chgis3	no		5 years?	contractor					
NOTE:	**The following hydrologic data is being reorganized and placed into a file geodatabase - descriptions below are for data as of 6/8/2007**														
Hydrology File Geodatabase	New Hope Basin Buffers	buffers	New Hope basin	shapefile - polygon	CH-Stormwater	Chgis3	no	approximate RCD area, dev. permits	semi-annual	rerun on streams data	None	3	1	2006	50, 100, and 150 ft Buffer Zones for Upper Jordan Lake Watershed
	Chapel Hill Buffers	buffers_clip	Town and beyond	shapefile - polygon	CH-Stormwater	Chgis3	no	clipped buffers for easier use	semi-annual	clipped from larger buffers	None	3	1	2006	50, 100, and 150 ft Buffer Zones for Chapel Hill Jurisdictional Limits
	Streamflow Model	demgord	Town and beyond	raster	CH-Stormwater	Chgis3	no	stream determinations	none planned	updated if new 10M DEM available	None	---	---		Stream flow prediction model, created by geography students, used for stream determination
	Chapel Hill Basins	Minor_Basins	Town and beyond	shapefile - polygon	CH-Stormwater, modified from Tetra Tech / EEP	Chgis3	yes	watershed planning	not updated		None	31	5		Delineates Chapel Hill's Minor Basins
	Chapel Hill Subbasins	town_subbasins	Town and beyond	shapefile - polygon	CH-Stormwater	Chgis3	yes	watershed planning, drainage assistance	not updated		None	208	11		Delineates Chapel Hill's sub-basins within Minor Basins
	Streams (New Hope Basin)	streams	New Hope basin	shapefile - polyline	CH-Stormwater	Chgis3	yes	stream determinations, RCD, illicit discharge, watershed planning, drainage assistance, stormsewer inventory	weekly	site visits	streams_alltypes	10,345	15	2006	Has metadata providing background on layer; updated continually as stream determination is performed on a case-by-case basis
					CH-Stormwater			general cartography			streams_noculvert_classified				
					CH-Stormwater			general cartography			stream_simple				
					CH-Stormwater			general cartography			streams_simple_classified				
					CH-Stormwater			stormsewer inventory			streams_stormsewer_check				
	Waterbodies (New Hope Basin)	waterbodies	New Hope basin	shapefile - polygon	CH-Stormwater	Chgis3	yes	stream determinations, illicit discharge, stormsewer inventory, RCD	monthly	site visits, dev. plans	waterbodies_alltypes	1764	10	2006	Has metadata describing background/usage, layer contains some dry and wet BMPs
					CH-Stormwater			general cartography			waterbodies_blue				
					CH-Stormwater			general cartography			waterbodies_bluegreen				
					CH-Stormwater			general cartography			waterbodies_simple				
	Stream Photo Points (also associated photos)	stream_photos	Town	shapefile - points, JPGs	CH - Stormwater	Chgis3	no		weekly	site visits					
Other Hydrology	Jordan Lake 14-digit Hydrologic Units	Jordan_Lake_HUCs	Jordan basin	shapefile - polygon	USGS	Chgis3	no	watershed planning	not updated	USGS	UCP_14digit	11	15		
	Upper New Hope Watershed	upper_jordan	New Hope basin	shapefile - polygon	clipped USGS	Chgis3	no	watershed planning	not updated	USGS		1	15		
	Upper New Hope 14-digit Hydrologic Units	upper_jordan_HUCs	Upper New Hope basin	shapefile - polygon	clipped USGS	Chgis3	no	watershed planning	not updated	USGS		7	15		
	Upper Cape Fear 14-digit Hydrologic Units	UCP_14digit	Upper Cape Fear basin	shapefile - polygon	USGS	Chgis3	no		not updated	USGS					
	North Carolina 14-digit HUCs	ncHUC-14digit	state	shapefile - polygon	NCDENR	Chgis3	yes - not imported		not updated	NCDENR					
	North Carolina River Basins	ncriver_basins	state	shapefile - polygon	NCDENR	Chgis3	yes - not imported		not updated	NCDENR					
	14-digit HUCs Southeast US	hucs_se250k (various)	southeast US	imported from Coverage to multiple shapefiles	USGS	Chgis3	no		?	USGS					
	Waterbodies (Haw Basin)	waterbodies_haw_basin	Haw basin	shapefile - polygon	USGS	Chgis3	no		?	USGS					
	Streams (Haw Basin)	streams_haw_basin	Haw basin	shapefile - polyline	USGS	Chgis3	no		?	USGS					
	As-builts of stormwater BMPs	(various)	N/A	(various)	CH - Inspections / Engineering	Chgis3	no		?	CH - Inspections / Engineering					

Appendix 2 - Chapel Hill Stormwater Data Inventory
GIS & Other Data Inventory (Updated as of July 2007)

Category	Description	Filename or Feature Class Name	Extent	File Type	Data Source	Data Location	Metadata	Common Uses	Update Frequency	Update Data Source	Display Layer(s)	# of Records	# of Attributes	Date	Comments
Other Hydrology Continued	Durham County Hydrologic lines	Dur_Hydro_lines	Durham County	shapefile - polyline	Durham City GIS	Chgis3	no		?	Durham City GIS					
	Durham County Hydrologic polygons	Dur_hydro_polygons	Durham County	shapefile - polygon	Durham City GIS	Chgis3	no		?	Durham City GIS					
	Portions of Durham City in Jordan watershed	durhamcity_In_Jordan_ws	Durham County	shapefile - polygon	Durham City GIS	Chgis3	no		?	Durham City GIS					
	Durham major Subbasins	major_sub-basins_durham	Durham County	shapefile - polygon	Durham City GIS	Chgis3	no		?	Durham City GIS					
NOTE:	**Much of the infrastructure data will be reorganized/reordered and placed into the same file geodatabase that is under development for hydrologic features**														
Infrastructure	Bridges		Town		CH-Stormwater	Chgis3	no		?						
	Drainage Problems - Reported Locations	drainage_problems	Town	shapefile - point	CH-Stormwater	Chgis3	no	drainage assistance	monthly	site visits, phone calls		80	1	2006	Address only, no easy link to drainage_problems
	Drainage Problem Master List - Spreadsheet	Drainage Problem Master List	N/A	EXCEL Spreadsheet	CH-Stormwater	Chgis3	no	drainage assistance	monthly	site visits, phone calls		85	13	2006	Data records from 2/2000 - 9/2005
	Stormsewer Inlets	inlets	Town	shapefile - point	CH-Stormwater	Chgis3	no	stormsewer inventory, illicit discharge, drainage assistance	weekly - monthly	site visits, dev. plans, as-builts, Town staff	Stormsewer Inlets blacknwhite			2006	inlet locations verified with GPS and then adjusted with aerials, Town working to fill in
					CH-Stormwater	Chgis3	no	stormsewer inventory, illicit discharge, drainage assistance			Stormsewer_Inlets_multi				
					CH-Stormwater	Chgis3	no	general cartography			Stormsewer_Inlets_simple				
	Stormsewer Lines	stormlines	Town	shapefile - polyline	CH-Stormwater	Chgis3	no	stormsewer inventory, illicit discharge, drainage assistance	weekly - monthly	site visits, dev. plans, as-builts, Town staff	stormsewer_lines	2852	19	2006	Have Structure ID#, jpgs, etc., lines were assumed, no actual inventory performed, no verification
	Stormsewer Outfalls	outlets	Town	shapefile - point	CH-Stormwater	Chgis3	no	stormsewer inventory, illicit discharge, drainage assistance	weekly - monthly	site visits, dev. plans, as-builts, Town staff	stormsewer_outfalls	790	26	2006	Have Structure ID#, jpgs, etc., layer partially verified, many outfalls still not in this layer
	Stormwater BMPs	(none yet)	Town	shapefile - polygon	CH-Stormwater	Chgis3	no		monthly?						attributes and layer currently being designed, data collection Summer-Fall 2006
	Infrastructure photos	(MANY folders)	N/A	JPGs and BMPs	CH - Stormwater	Chgis3	no								
	Public Works Maintenance Areas - 8 Major Divisions	Maint_area	Town	shapefile - polygon	CH-Stormwater	Chgis3	no	(same as Public Works Maintenance Areas - sliver polygons removed)	?			498	3		Maintenance Areas 1 - 8, within Chapel Hill limits only
Boundaries	Chapel Hill Town limits	ch_citylimits (same as chzlimits)	Town	shapefile - polygon	CH-Planning	Chgis3	no	general cartography, watershed planning	?		zoning	192	10		
	Zoning - Overlay Districts	ch_zoning_overlay_districts	Town	shapefile - polygon	CH-Planning	Chgis3	no	general cartography, watershed planning	?			6	10		Includes Historic District, Airport Hazard & Neighborhood Conservation - Same layer as Zoning - Overlay Districts (zonedist)
	Chapel Hill Zoning Jurisdictional Limits	ch_zlimits	town	shapefile - polygon	CH-Planning	Chgis3	no				zoning	192	10		
	Zoning - Overlay Districts	zonedist	Town	shapefile - polygon	CH-Planning	Chgis3	no					6	4		Same as ch_zoning_overlay_districts but attribute data not as extensive
	Chapel Hill Zoning Polygons	ch_zoning	Town	shapefile - polygon	CH-Planning	Chgis3	no	general cartography, watershed planning	?			3	6		Chapel Hill Jurisdictional Limits
	Watershed Protection District	water_protect_area	Town	shapefile - polygon	CH-Planning	Chgis3	no	illicit discharge, watershed planning	not updated			1	-		Attributes don't seem to be associated to topic of layer
	Durham City Limits	durham_city	Durham City	shapefile - polygon	Durham City GIS	Chgis3	no								
	Durham County Limits	durham_county	Durham County	shapefile - polygon	Durham City GIS	Chgis3	no								
	Carrboro City Limits	carrboro_city_limits	Carrboro	shapefile - polygon	Carrboro GIS	Chgis3	no								
	Carrboro Zoning Jurisdiction	carrboro_zoning_jurisdiction	Carrboro	shapefile - polygon	Carrboro GIS	Chgis3	no								
	Chapel Hill Urban Services Boundary	ch_urbanservices	Town	shapefile - polygon	CH - Planning	Chgis3	no								
	Stormsewer Maintenance Areas	Maint_area	Town	shapefile - polygon	CH - Engineering	Chgis3	no								
	State city boundaries	ncdotcitybdry	state	shapefile - polyline	NCDOT	Chgis3	no								
	State county boundaries	ncdotcntybdry	state	shapefile - polyline	NCDOT	Chgis3	no								
	State Government boundaries	ncdotgovbdry	state	shapefile - polyline	NCDOT	Chgis3	no								
	State Major Urban Areas	ncdotmajurb	state	shapefile - polygon	NCDOT	Chgis3	no								
	State Minor Urban Areas	ncdotminurb	state	shapefile - polygon	NCDOT	Chgis3	no								
	Neighborhoods - Modified from Planning version	neighborhoods	Town	shapefile - polygon	modified from CH - Planning to include several other large land uses	Chgis3	no								
	Orange County Boundaries	orange_county_line	Orange County	shapefile - polygon	?	Chgis3	no								
	Wake County Municipalities	wake_municipalities	Wake, Durham County	shapefile - polygon	?	Chgis3	no								
Parcels	Town Owned or Used Lots(public works, greenways, etc.)	town_owned	Town	shapefile - polygon	CH-Engineering	Chgis3	no	stormwater billing, watershed planning	yearly?			324	27		Land Use identified
	Chapel Hill Parcels clipped from Durham County data	durham_parcels	Town - Durham section	shapefile - polygon	clipped from Orange Co. GIS	Chgis3	no	practically everything	monthly			772	48	2006	Some overlap between Orange County Parcels
	Chapel Hill Parcels clipped from Orange County data	orange_parcels	Town - Orange section	shapefile - polygon	clipped from Orange Co. GIS	Chgis3	no	practically everything	monthly			29,138	100	2006	Some overlap between Durham County Parcels
	Chapel Hill Addresses	ch_addresses	Town	shapefile - points	modified from CH - Engineering	Chgis3	no								
	"Jan 1" parcels data for Orange and Durham Counties, 2004 through 2007 (stormwater billing)	(multiple files - archive)	Town	shapefile - polygons	Orange County & Durham County	Chgis3	no								
	miscellaneous Planning parcel selections - undeveloped lots, underdeveloped, existing, etc.	(multiple files)	Town	shapefile - polygons	CH - Planning	Chgis3	no								
	Chapel Hill Impervious Surface	fee_calculation - Impervious Surfaces	Town and slightly beyond	geodatabase - polygons	CH-Stormwater	Chgis3	no	assistance, stream determinations, general cartography, watershed planning	yearly / irregular	as-builts, site visits, aerial photography		65,656	16	2006	Digitized areas go to zoning limits, coded impervious surface type, also each area associated with an aggregate PIN
	Impervious Feature Code File	fee_calculation - feature_codes	N/A	geodatabase - table	CH-Stormwater	Chgis3	no	lookup	not updated						Identifies type of Impervious Surface Area

Appendix 2 - Chapel Hill Stormwater Data Inventory
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Category	Description	Filename or Feature Class Name	Extent	File Type	Data Source	Data Location	Metadata	Common Uses	Update Frequency	Update Data Source	Display Layer(s)	# of Records	# of Attributes	Date	Comments
Landuse	Stormwater Fee Tracking DB		N/A	Access DB	CH - Stormwater & CH - Finance	Chgis3	no	Stormwater billing							
	National Land Cover Dataset 1992 (NC)	north_carolina_nlcd_erd042 200	state	raster - TIF	EROS / USGS	Chgis3	yes - needs importing	watershed planning	?					1992	Layer Source is the USGS website, Stormwater uses occasionally for cartography, lyer covers entire State of NC
	National Land Cover Dataset 2001	(multiple files - general land cover, forest cover, urban)	state	raster - TIF	EROS / USGS	Chgis3	yes - needs importing	watershed planning							
	Chapel Hill Existing Landuse	ch_existing_land_use	Town	shapefile - polygons	CH - Planning	Chgis3	no	watershed planning							
	Landmarks	landmark	Town	shapefile - points	CH - Engineering	Chgis3	no								
	National Wetlands Inventory	NWIWetland	Chapel Hill Township (Orange County)	shapefile - polygons		Chgis3	no	watershed planning							
	Carroboro Impervious Surfaces	(broken up into multiple files)	Carrboro	shapefile - polygons	Carrboro GIS	Chgis3	no								
	Carrboro steep slopes and tree cover	(multiple files)	Carrboro	shapefile - polygons	Carrboro GIS	Chgis3	no								
Flood Zones and Hazard Planning	FEMA Flood Hazards	(broken, getting new copy)	Town and slightly beyond	shapefile - polygon	NC Flood Mapping (NCDEM)			hazard mitigation planning, RCD / dev. permits	?	NCDEM				2007	adopted 2/7/2007
	OLD FEMA Flood Zones	adjusted_floodzones	Town	shapefile - polygon	CH - Stormwater	Chgis3	yes	hazard mitigation planning, RCD / dev. permits	not updated		FEMA_floodzones	103	3	1983?	Identifies floodzone/floodway, modified from skewed scan of 1983 paper map
	OLD FIS Cross Sections	cross_sections	Town	shapefile - polyline	CH - Stormwater	Chgis3	yes	general cartography	not updated			106	3	1983?	"eyeballed" from 1983 paper map
	OLD FEMA Floodplain Elevation Marks	flood_elev_line	Town	shapefile - polyline	CH - Stormwater	Chgis3	yes	general cartography	not updated		FEMA_flood_elevations	204	2	1983?	"eyeballed" from 1983 paper map
	OLD Elevation Reference Marks - X on spot	reference marks	Town	shapefile - point	CH - Stormwater	Chgis3	yes	general cartography	not updated		FEMA_reference_marks	18	4	1983?	Contains Elevations and detailed location of reference mark location, "eyeballed" from 1983 paper map
	Preliminary NEW FEMA Flood Zones (Orange County)	NCFloodmapFloodplain	Orange County	shapefile - polygon	NC Flood Mapping (NCDEM)	Chgis3	no	hazard mitigation planning, RCD / dev. permits	?						Preliminary Version
	miscellaneous GIS themes related to new maps,	(multiple files)		shapefiles	NC Flood Mapping (NCDEM)	Chgis3	no	public info	?						Preliminary Version - 3 Volumes, includes flows, floodway, and floodplain data
	Critical Sites (Schools, Pump Stations,etc)	critical_facilities	Town	shapefile - point	CH - Stormwater	Chgis3	no	hazard mitigation planning	yearly?	?				2004	
	Repetitive Flood Damage Claim Sites	repetitive_loss	Town	shapefile - point	CH - Stormwater	Chgis3	no	hazard mitigation planning	none planned	?		22	1	2004	from FEMA claims, locations that have had more than 1 claim, all sites within Chapel Hill Town limits
	Atlantic Hurricane Tracks	atlantic_hurricane_tracks	East Coast USA	shapefile - polyline		Chgis3	yes - not imported	hazard mitigation planning							
	Major Atlantic Hurricanes	hurmjrl020	East Coast USA	shapefile - polyline		Chgis3	yes - not imported	hazard mitigation planning							
	Flashflood points	flashflood_points	Town	shapefile - point	CH - Stormwater	Chgis3	no	hazard mitigation planning							
Soils	Orange County Soils (SSURGO spatial data)	nc135_a	Orange County	shapefile - polygon	USDA - NRCS	Chgis3	yes - not imported	watershed planning	?	USDA - NRCS		10,237	8		Attributes include Soil Name
	Durham County Soils Map	Durham_soils	Durham County	shapefile - polygon	USDA - NRCS	Chgis3	no	watershed planning	?	USDA - NRCS		9,159	9		Attributes include Soil Name
	Orange County Soils (SSURGO database)	SSURGOv2_2002	N/A	Access DB	USDA - NRCS	Chgis3	no	watershed planning	?	USDA - NRCS					
	STATSGO NC Soils data	nc	state	shapefile - polygon	USDA - NRCS	Chgis3	yes - not imported		?	USDA - NRCS					large-area maps
Geology	aquifers - Upper Cape Fear, Lower Cape Fear, Pee Dee, Castle Hayne, Beaufort, Black Creek	(multiple files including sampling points)	NC coastal plain	shapefiles - points and polygons	Duke University	Chgis3	no?		?						
	Geologic Formations	geol_form (aka geol250)	Neuse River Basin	shapefile - polygons	Duke University	Chgis3	yes - not imported		?						
	Geologic Dikes	geol_dikes (aka geol250d)	Neuse River Basin	shapefile - polylines	Duke University	Chgis3	yes - not imported		?						
	Geologic Structures	geol_struct (aka geol250s)	Neuse River Basin	shapefile - polylines	Duke University	Chgis3	yes - not imported		?						
	many scans of NC and local geology paper maps, some historic	(multiple files)	Neuse River Basin	raster - MRSID	Duke University	Chgis3	no?		?						
Transportation	Chapel Hill Streets	streets	Town	shapefile - polyline	clipped from Orange Co. GIS	Chgis3	no	general cartography, drainage assistance	monthly	Orange County GIS		3,092	43	2006	Has attribute identifying who is responsible for street's maintenance
	Carrboro Streets	carrboro_streets	Carrboro	shapefile - polyline	Carrboro GIS	Chgis3	no		monthly	Orange County GIS					
	Greenways	greenway	Town	shapefile - polyline	CH - Planning	Chgis3	no		?	CH - Planning					
	Bikeways	ch_bikeways	Town	shapefile - polyline	CH - Planning	Chgis3	no		?	CH - Planning					
	Sidewalks	ch_sidewalks	Town	shapefile - polyline	CH - Planning	Chgis3	no		?	CH - Planning					
	State Primary Roads	ncdotprimrds	state	shapefile - polyline	NCDOT	Chgis3	no		?	NCDOT					
	State Roads	ncdotroads	state	shapefile - polyline	NCDOT	Chgis3	no		?	NCDOT					
	State Secondary Roads	ncdotsecrds	state	shapefile - polyline	NCDOT	Chgis3	no		?	NCDOT					
	Airport Runways (all NC)	ncdotairport	state	shapefile - polyline	NCDOT	Chgis3	no		?	NCDOT					
	Railroads (all NC)	ncdotrailrd	state	shapefile - polyline	NCDOT	Chgis3	no	general cartography	?	NCDOT		13,262	2		Layer has railroads for entire State of NC
	all Orange County streets (not just our Township)	orange_streets	All Orange county	shapefile - polyline	Orange County GIS	Chgis3	no		?	Orange County GIS					
	Bus Routes and Stops	(multiple files)	Town	shapefiles - points and polylines	CH - Planning	Chgis3	no		?	CH - Planning					

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OWASA	Gravity Sanitary Sewer Mains	GravitySewerMains	Chapel Hill - Carrboro	geodatabase - polyline	OWASA	Chgis3	no		?	OWASA					
	Sanitary Sewer Manholes	Manholes	Chapel Hill - Carrboro	geodatabase - points	OWASA	Chgis3	no		?	OWASA					
	Pressurized Sanitary Sewer Mains	PressurizedSewerMains	Chapel Hill - Carrboro	geodatabase - polyline	OWASA	Chgis3	no		?	OWASA					
	Sanitary Sewer Pump Stations	PumpStations	Chapel Hill - Carrboro	geodatabase - points	OWASA	Chgis3	no		?	OWASA					
	Wastewater Treatment Plant	WWTP	Chapel Hill - Carrboro	geodatabase - points	OWASA	Chgis3	no		?	OWASA					
	Hydrants	Hydrants	Chapel Hill - Carrboro	geodatabase - points	OWASA	Chgis3	no		?	OWASA					
	Drinking Water Lines	WaterLines	Chapel Hill - Carrboro	geodatabase - polyline	OWASA	Chgis3	no		?	OWASA					
	Drinking Water Service Laterals	WaterServiceLaterals	Chapel Hill - Carrboro	geodatabase - polyline	OWASA	Chgis3	no		?	OWASA					
	Drinking Water Tanks	WaterTanks	Chapel Hill - Carrboro	geodatabase - points	OWASA	Chgis3	no		?	OWASA					
	Drinking Water Treatment Plant	WTP	Chapel Hill - Carrboro	geodatabase - points	OWASA	Chgis3	no		?	OWASA					
	Cane Creek Critical Watershed Area	CaneCrkCriticalArea	western Orange county	shapefile - polygon	OWASA	Chgis3	no		?	OWASA					
	Cane Creek Watershed	cane_creek_wshd	western Orange county	shapefile - polygon	OWASA	Chgis3	no		?	OWASA					
	University Lake Critical Watershed Area	UnivLkCriticalArea	southern Orange county	shapefile - polygon	OWASA	Chgis3	no		?	OWASA					
	University Lake Watershed	university_lake_wshd	southern Orange county	shapefile - polygon	OWASA	Chgis3	no		?	OWASA					
UNC	UNC Buildings	UNC_Bldg	UNC main campus, Horace Williams, University Lake	shapefile - polygon	UNC GIS	Chgis3	yes		?	UNC - GIS					has addresses and descriptions
	UNC Properties	unc_prop	UNC main campus, Horace Williams, University Lake	shapefile - polygon	UNC - GIS	Chgis3	no		?	UNC - GIS					
	UNC Properties (for Stormwater Billing)	UNC_properties	Town	shapefile - polygon	CH - Stormwater	Chgis3	no		annual	CH - Stormwater					developed for stormwater billing
	UNC Stormwater Conveyances	conveyance	UNC Main Campus	geodatabase - polylines	UNC - GIS	Chgis3	yes		?	UNC - GIS					
	UNC Stormwater Structures	structure	UNC Main Campus	geodatabase - polylines	UNC - GIS	Chgis3	yes		?	UNC - GIS					
Water Quality	Water Quality Sampling Database (11/1993 - 4/2006) - links sites to WQ sample data	WQdatabase.mdb	N/A	Access Database	CH - Stormwater	Chgis3	no	store water q uality sampling data, produce reports and graphs	monthly	site visits				2006	variety of reports, graphs, and output options for raw data, plus input forms
	303d Listed Stream Segments	303d_listed	New Hope basin	shapefile - polyline	CH - Stormwater	Chgis3	no	watershed planning	next 303d list cycle			20	2	2006	Includes impaired streams for Upper New Hope Arm of Jordan Lake
	DWQ WQ Sites	DWQ_sites	New Hope basin	shapefile - point	CH - Stormwater	Chgis3	no	watershed planning	none planned			25	6	2006	Created using reports containing site description
	Haw River Assembly Sampling Sites	haw_r_assem_sites	Jordan Basin	shapefile - point	CH - Stormwater	Chgis3	no	watershed planning	none planned			8	2	2006	Created using reports containing site description
	USGS stream gauging / water quality sites	USGS_sites	New Hope basin	shapefile - point	CH - Stormwater	Chgis3	no	watershed planning	none planned			13	3	2006	Created using reports containing site description
	Water Quality Sampling Sites (Town)	wqsites	Chapel Hill and Carrboro	shapefile - point	CH - Stormwater	Chgis3	no	public info, watershed planning	possibly modify Fall 2007	CH - Stormwater		13	2	2006	Town water quality sampling sites
	Landfills and dumps in Chapel Hill (formal and informal)	Old_Landfills	Town	shapefile - polygon	CH - Stormwater	Chgis3	no	illicit discharge, watershed planning	irregularly			7	4	2006	Attribute containing landfill type
	RCRA Locations	RCRA_sites	New Hope basin	shapefile - point	CH-Stormwater, from EPA dataset	Chgis3	no	illicit discharge, watershed planning	as data comes available			40	3	2006	RCRA - Resource Conservation & Recovery Act, Contains links to latest EPA reports
	NPDES Dischargers in/near Chapel Hill	NPDES_sites	New Hope basin	shapefile - point	CH-Stormwater, from EPA dataset	Chgis3	no	illicit discharge, watershed planning	as data comes available			55	3	2006	Has attributes containing link to latest EPA reports on the NPDES Permit site - which then links to permit
	Underground Storage Tank Sites	UST_Sites	New Hope basin	shapefile - point	CH-Stormwater, from State database	Chgis3	no		as data comes available						
	Underground Storage Tank Leaks	UST_Leaks	New Hope basin	shapefile - point	CH-Stormwater, being merged with general UST layer	Chgis3	no	illicit discharge, watershed planning	trying to merge into UST sites			166	3	2006	Data dates range from 1989 to 2004, not all leaks located within Chapel Hill Town Limits
	Septic Systems - after July '03 - County file	Septic Systems post 07 03	N/A	EXCEL Spreadsheet	Orange County Health Department	Chgis3	no	illicit discharge, watershed planning	?					2005	
	Septic Systems - before July '03 - County file	Septic Systems pre 07 03	N/A	EXCEL Spreadsheet	Orange County Health Department	Chgis3	no	illicit discharge, watershed planning	?					2005	Making a shapefile to correspond to this database
	Septic systems (not entire county)	OCHD_septic_db	New Hope basin	shapefile - points	CH-Stormwater, from Orange County Health Dept DB	Chgis3	no	illicit discharge, watershed planning	as data comes available						
	Dry Cleaners and Laundromats	Dry_Cleaners	Town	shapefile - points	CH - Stormwater	Chgis3	no	illicit discharge, watershed planning	will be merged into generating sites					2007	
	Illicit Discharge Generating Sites	(none yet - will be developed from Dry Cleaners layer plus other data)	Town	shapefile-points	CH - Stormwater		no	illicit discharge, watershed planning	to be created					2007	

Notes: Many of these layers are used as background data for many kinds of maps, only their primary uses are listed
The originator or maintainer of a given dataset has been listed as the Data Source, even though much of this data is obtained through CH Stormwater or Engineering
# of Attributes does not include Shape and FID

Town of Chapel Hill Stormwater Management Program

Stormwater CIP Priority Rating System

REVISED DRAFT FINAL for Town Review- July 2008

General Information:		Project Number:	2008 - 003
Project Name:	Burning Tree Drive Culvert Replacement & Stream Restoration (EXAMPLE ONLY)		
Location:	Burning Tree Drive @ Cleland Dr		
Scope:	Culvert at Burning Tree Drive undersized and requires analysis and upgrade Stabilize and restore stream both upstream and downstream of Burning Tree culvert Evaluate connecting street drainage system along Cleland Evaluate downstream impacts of culvert upgrade	Preliminary Cost Estimate ($):	$650,000
Comments:	Complaints from neighborhood residents over the years Minor flooding impacts to residential property, relatively infequent Golf course located downstream May be able to "bank" credits for stream restoration beyond requirements for culvert impacts		
Rated By:	Stormwater Staff Member	Preliminary CIP Rating (%) 46.4	[100% = maximum rating]
Date:	23-Jul-08	Preliminary Benefit Index: 0.442	[1.0 = maximum benefit index]

Basic CIP Eligibility Criteria:

A -	Project must be located within corporate limits of Chapel Hill	[Y = YES N = NO]	Y
B -	Project must receive and/or convey public stormwater runoff	[Y = YES N = NO]	Y
C -	Project must be consistent with and advance Stormwater Management Program goals	[Y = YES N = NO]	Y
D -	Project must be consistent with overall Town policies and goals	[Y = YES N = NO]	Y
	* Project must satisfy Basic CIP Eligibility Criteria A, B, C, and D	[Y = YES N = NO]	Y

Criterion	Weight	Project Ratings	Project Rating Definitions (0 or 1)	5	10
Public Safety / Public Health	1.00	6	No safety / health hazard (0)	Intermediate safety / health hazard	High safety / health hazard [Threat to human life and limb]
Property Damage	0.95	4	No property damage (0)	Moderate property damage	Significant property damage
Regulatory Mandates	0.90	0	No mandate (0)	Intermediate priority mandate	High priority mandate
Water Quality Benefits	0.85	4	No water quality benefits (0)	Moderate water quality benefits	Significant water quality benefits
Stream Restoration Benefits	0.80	5	No benefits to stream system (0)	Moderate benefits to stream system	Significant benefits to stream system
MS4 Operation & Maintenance	0.75	7	No benefits to MS4 O&M (0)	Moderate benefits to MS4 O&M	Significant benefits to MS4 O&M
Source of Problem	0.75	9	Low level of public runoff (1) [Less than 10% public at POI]	Intermediate level of public runoff [25% public at POI]	High level of public runoff [50% or greater public at POI]
Permitting Requirements	0.60	8	Very difficult to permit (1)	Potential permitting issues	No permitting issues
Mitigation Requirements	0.50	9	High level of mitigation (1) [30% of project cost or higher]	Moderate level of mitigation [15% of project cost]	No mitigation required [0%]
Complexity of Project	0.50	6	Very complex (1)	Typical or moderate level of complexity	Simple solution
Impact of Project	0.95	3	Affects only one or a few individual properties (1)	Affects moderate-sized area and/or moderate-sized drainage basin	Affects large area and/or watershed within Chapel Hill
Community Character	0.40	4	No community character benefits (0)	Moderate community character benefits	Significantly enhances community character
Innovative Technologies	0.30	6	No innovative technologies (0)	Moderate use of innovative technologies	Significant use and/or advancement of innovative technologies
Cost of Project	0.70	1	High cost project (1) [$500,000 or more]	Intermediate cost project [$250,000]	Low cost project [$20,000 or less]
Cost-Sharing	0.50	0	No cost-sharing (0) [0%]	Intermediate level of cost-sharing [25% cost-sharing]	High level of cost-sharing [50% or greater cost-sharing]

Town of Chapel Hill Stormwater Management Program
Stormwater CIP Priority Rating System

General Information: **Project Number:** 2008 - 003

Project Name: Burning Tree Drive Culvert Replacement & Stream Restoration (EXAMPLE ONLY)

Location: Burning Tree Drive @ Cleland Dr

Scope:
Culvert at Burning Tree Drive undersized and requires analysis and upgrade
Stabilize and restore stream both upstream and downstream of Burning Tree culvert
Evaluate connecting street drainage system along Cleland
Evaluate downstream impacts of culvert upgrade

Preliminary Cost Estimate ($): $650,000

Comments:
Complaints from neighborhood residents over the years
Minor flooding impacts to residential property, relatively infequent
Golf course located downstream
May be able to "bank" credits for stream restoration beyond requirements for culvert impacts
0

Rated By: Stormwater Staff Member

Date: 23-Jul-08

Preliminary CIP Rating (%) 46.4 [100% = maximum rating]

Preliminary Benefit Index: 0.442 [1.0 = maximum benefit index]

Basic CIP Eligibility Criteria:

A -	Project must be located within corporate limits of Chapel Hill	[Y = YES N = NO]	Y
B -	Project must receive and/or convey public stormwater runoff	[Y = YES N = NO]	Y
C -	Project must be consistent with and advance Stormwater Management Program goals	[Y = YES N = NO]	Y
D -	Project must be consistent with overall Town policies and goals	[Y = YES N = NO]	Y
	* Project must satisfy Basic CIP Eligibility Criteria A, B, C, and D	[Y = YES N = NO]	Y

Criterion	Weight	Project Ratings	Weighted Project Points	Weighted Maximum Available Points	% Project Points	% Maximum Available Points	% Contribution to Benefit Index	Actual Contribution to Benefit Index	Rating Definitions (0 or 1)	5	10
Public Safety / Public Health [Benefit]	1.00	6	6.0	10.0	12.4	60.0	20.9	0.092	No safety / health hazard (0)	Intermediate safety / health hazard	High safety / health hazard [Threat to human life and limb]
Property Damage [Benefit]	0.95	4	3.8	9.5	7.8	40.0	13.2	0.058	No property damage (0)	Moderate property damage	Significant property damage
Regulatory Mandates	0.90	0	0.0	9.0	0.0	0.0	n/a	n/a	No mandate (0)	Intermediate priority mandate	High priority mandate
Water Quality Benefits [Benefit]	0.85	4	3.4	8.5	7.0	40.0	11.8	0.052	No water quality benefits (0)	Moderate water quality benefits	Significant water quality benefits
Stream Restoration Benefits [Benefit]	0.80	5	4.0	8.0	8.3	50.0	13.9	0.062	No benefits to stream system (0)	Moderate benefits to stream system	Significant benefits to stream system
MS4 Operation & Maintenance [Benefit]	0.75	7	5.3	7.5	10.8	70.0	18.3	0.081	No benefits to MS4 O&M (0)	Moderate benefits to MS4 O&M	Significant benefits to MS4 O&M
Source of Problem	0.75	9	6.8	7.5	13.9	90.0	n/a	n/a	Low level of public runoff (1) [Less than 10% public at POI]	Intermediate level of public runoff [25% public at POI]	High level of public runoff [50% or greater public at POI]
Permitting Requirements	0.60	8	4.8	6.0	9.9	80.0	n/a	n/a	Very difficult to permit (1)	Potential permitting issues	No permitting issues
Mitigation Requirements	0.50	9	4.5	5.0	9.3	90.0	n/a	n/a	High level of mitigation (1) [30% of project cost or higher]	Moderate level of mitigation [15% of project cost]	No mitigation required [0%]
Complexity of Project	0.50	6	3.0	5.0	6.2	60.0	n/a	n/a	Very complex (1)	Typical or moderate level of complexity	Simple solution
Impact of Project [Benefit]	0.95	3	2.9	9.5	5.9	30.0	9.9	0.044	Affects only one or a few individual properties (1)	Affects moderate-sized area and/or moderate-sized drainage basin	Affects large area and/or watershed within Chapel Hill
Community Character [Benefit]	0.40	4	1.6	4.0	3.3	40.0	5.6	0.025	No character benefits (0)	Moderate community character benefits	Significantly enhances community character
Innovative Technologies [Benefit]	0.30	6	1.8	3.0	3.7	60.0	6.3	0.028	No innovative technologies (0)	Moderate use of innovative technologies	Significant use and/or advancement of innovative technologies
Cost of Project	0.70	1	0.7	7.0	1.4	10.0	n/a	n/a	High cost project (1) [$500,000 or more]	Intermediate cost project [$250,000]	Low cost project [$20,000 or less]
Cost-Sharing [Benefit]	0.50	0	0.0	5.0	0.0	0.0	0.0	0.000	No cost-sharing (0) [0%]	Intermediate level of cost-sharing [25% cost-sharing]	High level of cost-sharing [50% or greater cost-sharing]
Total Points or %:		72.0	48.45	104.50	100.0	n/a	100.0	0.442			

Preliminary CIP Rating (%) = 48.45 **divided by** 104.50 **x 100 equals =>** 46.36 %

Preliminary Benefit Index = 28.70 **divided by** 65.00 **equals =>** 0.442

Town of Chapel Hill Stormwater Program Master Planning Project - Phase 1
Master Matrix of Internal & External Stakeholder Survey Questions

#	Survey Question	INTERNAL STAKEHOLDERS						EXTERNAL STAKEHOLDERS	BCS
		Stormwater Advisory Board	Stormwater Staff	Manager's Office	Town Council	Town Department Heads & Staff	Town Advisory Boards and Commissions		Community Residents
1	Rate the overall water quality of the creeks, streams, and lakes in Chapel Hill.	1	10	4	5	5			9
2	How do you think the typical citizen of Chapel Hill would rate the overall water quality of local creeks, streams, and lakes?	2	11	5	6				
3	How significant do you think each of the following potential sources of water pollution is to the quality of streams and lakes in Chapel Hill?	3	14	7	8	10	10	9	11
4	Of all the above possible souces of water pollution, please select and rank those which you think are the six largest sources.	4	15						
5	Are you aware of any other potential sources of water pollution to receiving streams and lakes in Chapel Hill?	5	16	8		11			
6	Are you aware of any specific water pollution problems in local creeks, streams, ponds, or lakes within Chapel Hill?	6							
7	Are you aware of any storm drainage problems in Chapel Hill?	7					13	12	
8	Are you aware of any hazardous flooding problems in Chapel Hill?	8							
9	Stormwater program mission & priorities: Please rank the relative importance of the 10 program priorities.	9	17	13	13				
10	Please review and rate each as either a Strength (3), a Positive with room for improvement (2), or a Weakness (1) of the current program.	10	18	14					
11	What other Strengths do you see in the current stormwater management program?	11	19	15					
12	What other Weaknesses or Deficiencies do you see in the current stormwater management program?	12	20	16					
13	What are the most significant and important accomplishments of the Town's stormwater management program to date?	13	21	11	10	13			
14	What are the most significant and important challenges facing the Town's stormwater management program?	14	22	12	11	14			
15	If additional financial resources are needed, how much do you think the Chapel Hill public would be willing to pay for stormwater services?	15							
16	Public R/W only vs. System beyond R/W: Which statement better states your thinking?	16	13	17	14	15			
17	How important is the Town's stormwater management program to the Town's comprehensive plan?	17	27	23	19				
18	How important do you think it is to align the Town's stormwater program with regional stakeholder interests?	18	28	24	20				
19	How important do you think it is to align the Town's stormwater program with regional stakeholder interests if this increases costs?	19	29	25	21				
20	Describe the intensity of the following stormwater-related problems in Chapel Hll over the last five to ten years.	20	12	18	12				
21	What should be the most important measures of success for Chapel Hill's stormwater management program?	21	23	19	18				
22	Which stormwater services (existing and/or future) provided by the Town are most important and valued from the perspective of residents?	22	6	9	9	9			
23	If the Chapel Hill stormwater program was "benchmarked" today against other programs in NC, how do you think it would rate comparatively?	23	30						
24	Construction site erosion and sediment control: With which statement do you agree?	24	24	20	15	16	11	10	18
25	How well does the storm drainage system generally function within Chapel Hill?	25	25	21	16	17	12	11	12
26	How would you generally rate the maintenance of the storm drainage system within Chapel Hill?	26	26	22	17	18			
27	In a paragraph or less, please describe your vision of the most successful stormwater management program for Ch-Hill within the next 10 years.	27	32	27	22				
28	Survey Recipient Information: Name, Position(Town Staff), Telephone #, Email address, Department & Division, Advisory Board, Commission or Organization Name		0	0		0	Contact Info	Contact Info	
29	What is the length of your service as a full-time employee (or elected Council/Board member or external agency) of the Town of Chapel Hill?		1	1	2	1			
30	Have you worked in other Departments or Divisions during your career with the Town of Chapel Hill? If YES, which other Departments?		2			2			
31	Stormwater Staff & Engineering Director: What are the specific stormwater programs and services in which you are involved.		5						
32	Can you think of any new and/or enhanced stormwater programs or services that may be desirable for citizens and property owners?		7	10					
33	How do citizens and property owners typically contact the Town for assistance with a stormwater-related issue?		8						
34	What are the most common types of stormwater-related inquiries from citizens and property owners?		9	6	7	8			
35	Do you think it would be helpful for Town employees to receive more information and training on stormwater requirements and programs?		31	26		19			
36	Do the Town's stormwater goals, programs, and services have any relationshop or bearing upon the goals and activities of your organization?					12	20	19	
37	If YES to previous question, please note the specific ways in which the Stormwater program can support and help advance your goals & vice-versa.					12	21	20	
38	Which Town of Chapel Hill Advisory Board/Commission do you represent?						1		
39	How important is the natural environment as an element of your Advisory Board/Commission (or of your work's) organizational goals?						3	2	
40	Have you or any members of your organization had interactions within the past 2 years with the Town's SW Management Program or SW Adv Board?						16	15	
41	If yes to the previous question, please describe the nature or extent of interaction(s).						17	16	
42	If you had interaction within the last 2 years, were you satisfied with the response you received? (Refers to above Q. 40)						18	17	
43	If you had interaction within the last 2 years, and were not satisfied with the response, please explain why. (Refers to above Q. 40)						19	18	
44	How would you rate the overall quality of life in Chapel Hill?		3	2	3	3	2	1	1
45	How important do you think protecting the natural environment is to quality of life in Chapel Hill?		4	3	4	4			2
46	How aware were you of the Town of Chapel Hill's stormwater management program before you received this survey?						4	3	3
47	If aware of the stormwater management program, how did you learn about it?						5	4	4
48	Are you aware that property owners in Chapel Hill pay a stormwater fee to fund stormwater programs and services provided by the Town?					7	6	5	5
49	Where does stormwater go after it enters storm drains in Chapel Hill?						8	7	7
50	Chapel Hill's drinking water comes from_____?								8
51	Does the Town have a responsibility to provide stormwater programs/services to reduce pollution entering into local creeks and lakes?						9	8	10
52	Overall, how serious a problem is drainage and flooding due to stormwater runoff in Chapel Hill?					6			
53	Should the Town should provide funding and technical help to reduce drainage and flooding problems on private property within Chapel Hill?						14	13	14
54	Does your property or neighborhood have drainage or flooding problems?								13
55	Have you contacted the Town within the last year for assistance with a stormwater-related issue (such as drainage, flooding, erosion, etc.)?								15
56	If YES to previous question, were you satisfied with the response and service you received from the Town?								16
57	If NO to the previous question, please explain why.								17
58	Does a lawn care company provide service for your yard or common area?								20
59	If YES to the previous question, which services do they provide?								21
60	If you do not use a lawn care service, what actions do you perform to take care of your yard?								22
61	Does your household have a pet dog?								23
62	If YES to the previous question, how often do you or the designated dog walker pick up pet wastes for disposal?								24
63	Do you take your used chemicals, paint, batteries, or other household hazardous wastes to the Orange County HHHW Center ?								25
64	Do you change your vehicle's motor oil at home?								26
65	If yes to the previous question, what do you do with the used motor oil?								27
66	Do you agree or disagree that unmowed vegetation should be kept along the edges of creeks and lakes?						15	14	19
67	Have you ever used the Town's Internet Website (www.townofchapelhill.org) for access to stormwater-related information?						7	6	6
68	Please share any comments, questions, or suggestions that you may have regarding the Town's stormwater programs and services.		33	28	23	20	22	21	28
69	Demographic: What is your gender?								29
70	Demographic: What is your age group?								30
71	Demographic: What is your ethnicity?								31
72	Demographic: Do you rent or own your residence?								32
73	Demographic: What kind of residential property do you live in?								33
74	Demographic: How many people (including yourself) live in your household?								34
75	Demographic: How long have you lived in Chapel Hill?				1				35
76	Demographic: Are you currently a full-time college student?								36
77	Demographic: What is the highest level of education you have completed?								37
78	Demographic: What is your Chapel Hill zip code?								38
79	Demographic: What is your annual household income?								39
	Audience and Number of Surveys	To All Stormwater Advisory Board Members (12 Received)	To All Stormwater Staff Members (5 Received)	To All Manager's (2 Received)	To All Council Members (2 Received)	To All Department Heads & Sr. Staff (39 Received)	To All Boards & Commissions (5 Received)	25 External Stakeholder Surveys (12 Received)	Mailed 3,000 (793 Received)

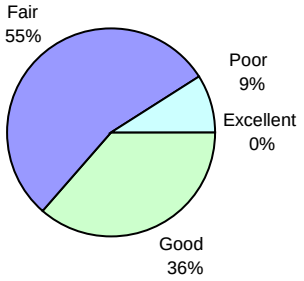
Summary Results in Chart and/or Table herein
See Individual Surveys for Results

Survey Color Coding (Question Number within Individual Survey Identified)
- Completed in Phase 1

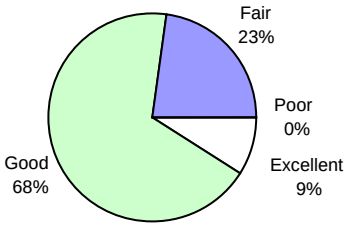
Appendix 5a – Stormwater Advisory Board Survey Results

(12 survey participants from Stormwater Management Advisory Board)

1. **Based on *your current knowledge and opinion*, please rate the overall water quality of the creeks, streams, and lakes in Chapel Hill.**



2. **How do you think the *typical citizen of Chapel Hill* would rate the overall water quality of local creeks, streams, and lakes?**



3. **How significant do *you* think each of the following potential sources of water pollution is to the quality of streams and lakes lying within Chapel Hill?**

Potential Sources of Water Pollution	Very Significant	Significant	Not Significant
a. Disposal and discharges from commercial operations	27%	46%	27%
b. Discharges from sewage treatment plants	18%	23%	59%
c. Pollutants that are deposited from the atmosphere	20%	50%	30%
d. Runoff from parking areas and streets	59%	41%	0%
e. Runoff from farms and agricultural operations	18%	0%	82%
f. Runoff from forested or undeveloped land areas	0%	9%	91%
g. Runoff from University-owned and operated properties	40%	60%	0%
h. Runoff from Town-owned and operated properties	23%	68%	9%
i. Runoff from developed residential land areas	55%	45%	0%
j. Runoff from commercial land areas	64%	27%	9%
k. Runoff from construction sites or other disturbed land areas	77%	23%	0%
l. Stream bank erosion	50%	50%	0%
m. Oil, grease, household chemicals, and other wastes disposed of in storm drains or natural areas by residents	27%	46%	27%
n. Accidental spills of industrial and/or commercial chemicals	18%	18%	64%
o. Discharges from septic tanks or septic systems	0%	36%	64%
p. Discharges from sanitary sewer pipes/systems	9%	36%	55%
q. Litter	10%	40%	50%
r. Waste matter from wildlife	0%	50%	50%
s. Leaking landfills	0%	14%	86%
t. Leaking Underground Storage Tanks	10%	20%	70%
u. Improper use of fertilizers	41%	59%	0%

4. Of all the above possible sources of water pollution, please select and rank those which *you* think are the six largest sources of pollution within Chapel Hill.

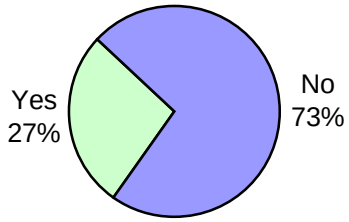
Of those selected, an average ranking is shown.

Potential Sources of Water Pollution	Total # of Hits	Avg. Ranking
a. Disposal and discharges from commercial operations	3	5.33
b. Discharges from sewage treatment plants	2	4.00
c. Pollutants deposited from the atmosphere	1	1.00
d. Runoff from parking areas and streets	**9**	**1.56**
e. Runoff from farms and agricultural operations	1	6.00
f. Runoff from forested or undeveloped land areas	-	
g. Runoff from University-owned and operated areas	**8**	**3.63**
h. Runoff from Town-owned and operated areas	4	5.00
i. Runoff from developed residential land areas	**8**	**3.50**
j. Runoff from commercial land areas	**7**	**3.29**
k. Runoff from construction sites or disturbed land areas	**8**	**3.00**
l. Stream bank erosion	**7**	**4.57**
m. Oil, grease, household chemicals, and other wastes disposed of in storm drains or natural areas by residents	-	
n. Accidental spills of industrial and/or commercial chemicals	-	
o. Septic tanks and septic systems	-	
p. Sanitary sewer pipes/systems	1	3.00
q. Litter	1	6.00
r. Waste matter from wildlife	1	5.00
s. Leaking landfills	-	
t. Leaking underground storage tanks	-	
u. Improper use of fertilizers	-	

"Top 6" Sources of Water Pollution, Ranked from Largest to Least

d. Runoff from parking areas and streets	**1.56**
k. Runoff from construction sites or disturbed land areas	**3.00**
j. Runoff from commercial land areas	**3.29**
i. Runoff from developed residential land areas	**3.50**
g. Runoff from University-owned and operated areas	**3.63**
l. Stream bank erosion	**4.57**

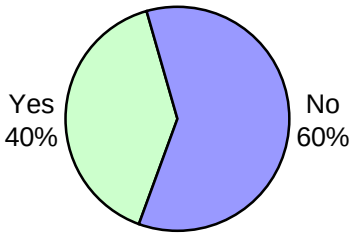
5. Are you aware of any other potential sources of water pollution to receiving streams and lakes in Chapel Hill that are not listed above in #4?



If YES to Question 5, please describe:

- Bio-retention, lack of maintenance
- Potentially fuel spills – assume Fire Department is prepared, as well as for HAZMAT

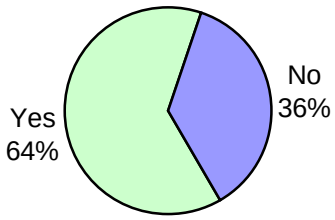
6. Are you aware of any specific water pollution problems in local creeks, streams, ponds, or lakes within Chapel Hill?



If YES to Question 6, please describe:

- Bolin Creek - from erosion, drainage, and Carrboro
- Meeting of the Waters (very small creek with lots of sources)
- Eastwood Lake, periodically – multiple sources
- University Lake, periodically – multiple sources
- Failure of erosion control practices during construction is a persistent problem that has devastated lakes and streams with sediment. Lake Ellen, for example, has been seriously impacted with massive plums of sediment from construction projects.
- Low awareness of neighbors throughout town in the rationale behind maintaining vegetated riparian buffers along ephemeral and perennial streams. A visual inspection in my neighborhood revealed that many buffers are mowed.
- Low awareness of neighbors about the impacts of fertilizers.
- Downstream along Meetings of the Waters Creek (just after UNC baseball field) is severely impacted. Meetings of the Waters flows through the Botanical Gardens which is an absolute gem for Chapel Hill. The Botanical Gardens is now becoming a major international research site, restoration site for seed from endangered plant species, and a public amenity. A foul stream running through is not good.
- Eastwood Lake, periodically was recently dredged – a major sediment trap
- Increased erosion along Bolin Creek
- Creeks throughout neighborhoods – rip-rapped
- Most of the streams are impaired, but there are a variety of contributory sources for each of the streams. The (sources) are pretty well covered above and there are numerous reports that exist that have been prepared for the Town that highlight the problems.
- Sedimentation in Booker Creek watershed, including bank erosion
- OWASA spills from time-to-time
- Bird and mammal wastes in stream, lake, near-shore areas
- Construction sites, including small ones

7. Are you aware of any *storm drainage problems* in Chapel Hill?



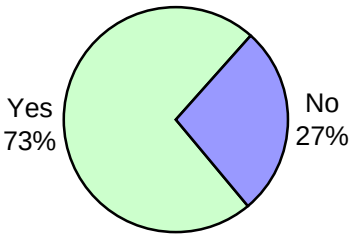
If YES to Question 7, please note and describe those areas:

- Piping and natural drainages in need of maintenance
- Untreated stormwater, generally
- Vegetative growth, such as trees and bushes inside the drainage way, along Tinkerbell Creek that can block flow of water
- Peak flows in almost all creeks – bank erosion and sediment transport

- Defer to lists for streets, yards, etc.
- Eastgate
- Projects specifically addressed by the Town
- Extensive commercial development built in Booker Creek floodplain. Commercial vacancy rates in Eastgate Shopping Center, for example, are higher due in part to regular flooding. Town's flood hazard mitigation plan should more seriously address this issue. It is a land use issue, and not simply a building code or structural protection issue.

8. Are you aware of any *hazardous flooding problems* in Chapel Hill?

If YES to Question 8, please note and describe those areas:



- As prepared on updated floodplain maps
- Low lying areas, like Camelot
- Am aware of problems at the two malls and the housing complex across from University Mall
- Roadways and paths in low areas
- Bolin Creek, Camelot, Umstead
- Eastgate
- Residential areas near University Mall. Houses next to largest 3 streams in town

9. Stormwater Program Mission (Core Purpose)

It is the mission of the comprehensive stormwater management program to:

- Protect the health and safety of both the public and the ecosystem,
- Address both stormwater quality and stormwater quantity concerns, and
- Meet or exceed federal and state mandates regarding stormwater.

Please rank the importance *to you* of the 10 following program priorities Place "1" in front of the program priority that you believe is *most important* to help advance the Program Mission and Purpose, "2" for the Program Priority that is the *next most important*, and so on up to "10" for the Program Priority that is the *10th most important*.

Program Priorities (Ranked by Relative Importance)	Avg. Ranking
Develop and implement a comprehensive Stormwater Program Master Plan that supports all of the stormwater program priorities.	1.27
Address stormwater quality as an integral function within the program.	4.64
Ensure compliance with federal and state regulatory mandates.	4.64
Address stormwater quantity (flooding) as an integral component within the program.	4.91
Define the level of service and performance standards for the Town's Stormwater Program.	5.30
Protect and restore natural stream corridors.	5.36
Develop a formal public education and involvement program.	5.82
Integrate programs to utilize resources efficiently.	6.55
Establish clear stormwater program leadership that the public recognizes.	7.45
Establish an understanding of the stormwater system as a "utility."	8.64

10. Please review and rate each of the following as either a Strength (3), a Positive with room for improvement (2), or a Weakness (1) of the CURRENT Chapel Hill Stormwater Management Program:

Avg. Rating	Element of Program	Comments
2.18	Environment of openness and desire for input from stakeholders	• Vastly improved • Maybe overdone • Staff and Advisory Board have not established sufficient level of trust and collaboration
1.60	Public awareness and acceptance of the stormwater fee	• Most don't care; those that do are opposed • Need a plan before trying hard on this
2.18	Volunteer involvement in stormwater pollution prevention programs	• No evidence yet of a volunteer program
2.10	Support for the program from the Town Manager	• They like having the extra $
2.45	Support for the program from the elected Town Council	• They like having the extra $ • Perception that majority of Council is more interested in revenues than a real SW program
1.55	Appropriate level of staff resources to implement the program	• Burdensome hiring procedures (We need those procedures, but HR should recognize that Stormwater is their client and help) • "Program" still lacks definition
1.41	Appropriate level of financial resources to implement the program	• Too much $ goes into General Fund or Public Works • Funding is too low, but we need to have the Master Plan to demonstrate why we need more $ • "Program" still lacks definition
1.40	Performance indicators for stormwater programs and projects	• Our current stream sampling program is not satisfactory and we need to establish a range of performance indicators. • "Program" still lacks definition
2.15	Compliance with state and federal regulatory requirements	• May become out of compliance
1.45	Linkage of the stormwater program to the Town's Comprehensive Plan	• We are working on how to refine these linkages
1.60	Stormwater system maintenance services	• Should be done by OWASA under a performance contract • Have these been defined?
2.41	Customer service on billing and other stormwater utility questions	• Staff is understaffed and needs help in this area • Not aware of any problems

1.50	Fee crediting program with incentives for enhanced stormwater management	• Not sure we are doing this • Probably just need to advertise more plus make it more robust in the Master Plan stage • Do not now endorse such program • Huge potential • Does this exist yet?
1.40	Stormwater capital improvement programs	• Problem here is long time frame to execute • We will find that it is significantly underfunded. We may need a bond issue (revenue bonds) to be paid back with increased user fees. We will never get it done if we depend on current income. • Not aware of a (CIP) plan
2.09	Drainage assistance programs for residents and property owners	• Not developed but proposed; could be better implemented
1.68	Local water quality sampling and monitoring programs	• We need to do this correctly, not just grab samples during non-storm events • Lacking standard for assessing data • Present program has no apparent goal, objectives, or systemic rationale
1.80	Stormwater management requirements for new development and redevelopment within the Town's jurisdiction	• There is a big disconnect with the Planning Dept. • The Master Plan needs to look at how we will address these issues when we need to look regionally and not just one subdivision at a time • "3," although can always improve
1.70	Control of erosion and sediment from construction and land disturbances	• This (construction) should not be the job of the stormwater program • More enforcement • Is this the sediment control program?
1.67	Leverage of local stormwater resources to seek external grant opportunities	• We have $ in the (stormwater) utility if the town would let us keep it in the program • Need to look at this when we find out what the needs are and how we can apply for funds for innovative ideas
2.57	Participation in the "Clean Water Education Partnership" under TJCOG	• Staff does a great job

11. What other STRENGTHS not listed above do you see in the current Stormwater Management Program?

- Very able and dedicated staff
- Progress in setting up the program, the fees, and the plan.
- Strong feeling of stewardship from citizens
- Great staff who are committed to program, creative in their approach to almost every challenge, and willing and interested in working with other Town departments.
- Mapping, GIS, inventory
- Capable staff
- Some very capable individuals on the Board and Staff
- General willingness of local citizens to "do the right thing" regarding the local environment and resource base.

12. What other WEAKNESSES or DEFICIENCIES not listed above do you see in the current Stormwater Management Program?

- The program lacks an overarching framework to guide future new urban development and address stormwater problems caused by existing development in ways that are compatible with watershed protection. Framework needs to be institutionalized throughout all departments that deal with urban development, infrastructure, and transportation systems.
- Need a stronger public and stakeholder education component to increase awareness of stormwater problems and how they can be dealt with.
- No satisfactory answer yet to the question of fee-payers: "what's in it for me?"
- Established fee enforcement mechanism.
- Lack of cooperation between all involved parties - cities/county/state relationships
- Inadequate funding for program and budget allocation decisions made regarding distribution of the utility fee.
- Understanding what needs repair / replacement and a priority sequence of these items.
- Education – follow example of recycling programs – empower individuals with specific tasks and straightforward messages.
- We are paying Public Works for services and, until recently, did not know for what. We are also being charged by other departments. Since we do not use time sheets, it is difficult to judge what services we are getting and whether they are "competitive."
- Because Public Works is not accountable to Stormwater, we have no way of effectively managing those resources, except for the good nature of the leaders of the Department.
- Stormwater should be its OWN department, and does not belong under Engineering. There is too much overhead because of the current arrangements.
- Some challenges filling vacant positions that have affected production
- Too much focus on process rather than program and results.
- Insufficient communication between Public Works and others.
- General issue of Town's tending to micromanage and go overboard with getting input versus results.
- Lack of consensus within community and among Town Council, staff, and Advisory Board about the definition and focus of the stormwater program.

13. What do *you* believe are the most significant and important accomplishments of the Town's Stormwater Management Program to date?

- Town of Chapel Hill has assembled a very capable staff.
- Some elected officials are very dedicated to seeing a strong (stormwater) utility.
- Town's strong commitment to creating a stormwater master plan.
- Getting the process started.
- Getting organized – with utility
- Education program
- Starting to develop Master Plan – thought the Plan design and implementation has been slow and I'm interested in seeing some substance at this point. The Stormwater Advisory Board needs to be kept better informed of consultant activities and $ being spent.
- Establishing a separate utility to cover stormwater
- Focused staff
- Qualified staff
- Securing commitment from Town Manager for comprehensive stormwater plan; improvements in working with Engineering and Public Works Department on what should be funded as a stormwater project.
- Efforts to satisfy citizens / utility complaints and flooding complaints.
- Monitoring streams
- Efforts towards stormwater master plan
- Efforts to control local flooding
- Simply getting going. This has been a slow process.
- Last year at this time, we had some issues as the contract for the Master Plan was being negotiated. Staff worked with the Advisory Board through this process.
- Not seriously "dropping balls" while staff is diverted to other stuff and short-handed.
- Getting basic program priorities defused to get on with master plan.
- Establishing mechanics of fee calculation and collection.
- Roll-out of the billing and collection system for stormwater fees
- Getting this far in organizing the program, establishing the fee, and starting the planning process.

14. What do *you* believe are the most significant and important challenges facing the Town's Stormwater Management Program?

- Producing and implementing a high quality master plan.
- Completion of the master plan.
- Education of the town population.
- Obtaining sufficient funding for effective implementation.
- Keeping the money that the utility generates within the program – especially at early stages when building infrastructures
- Getting stormwater planning well integrated with Town of Chapel Hill Planning Department. Better communication with planning activities prior to current process. This might mean assigning a role within SWP to attend Planning Department meetings. Don't know the level of current communication with particular staff.
- Utility becomes a cash cow for other agendas.

- Increasing Chapel Hill residents' and property owners' understanding of purpose and need for the stormwater utility fee and what they can do in their daily lives to reduce impacts of stormwater from their activities – reductions in both quantity and quality.
- Show the stakeholders that we are using the money to accomplish deserved projects.
- Stream quality and erosion of natural streambeds.
- Establishing greatest non-point source of runoff: quantity hurting water quality
- PR related to above
- Conveying to public what happens to stormwater "after the storm" – why they should use BMP's and what they are.
- Getting a Master Plan (MP) developed in the shortest time possible. It is the crutch everyone uses when they say, "Oh we are not sure what to do until the MP is complete."
- Priority setting
- Cost effectiveness
- Getting on-the-ground results vs. feel-good rhetoric
- Master planning and clear definition of the program and priorities. The program needs to establish visible and tangible products and results ASAP in order to establish and sustain some credibility and sense of value among the ratepayers.
- Get through this plan process promptly, so that we can get on to answering the fee-payer's question: "What's in it for me?" (The best answer: complete a few solid drainage projects and let people know; and get a pipe system and treatment in place so that we can start to improve water quality and let people know.)
- Get the Town to stop siphoning off fee revenues to other purposes.
- Get a reasonably workable fee enforcement process in place.
- Solve the upstream Carrboro problem.
- Let's get better and more information on successful programs in other comparable NC communities – how they have addressed the problems.

15. The current annual stormwater utility fee in Chapel Hill is $39 for every 2,000 square feet (or per Equivalent Unit: "EU") of impervious area. If additional financial resources are needed to advance stormwater program goals and objectives desired by the Town Council, Advisory Board, and citizens, how much do you think the Chapel Hill public would be willing to pay for stormwater services (within the next several years, for example)?

25%	Stormwater fee increases would likely be unacceptable to the public
50%	The public may accept up to a 10% rate increase ($43/year/EU)
25%	The public may accept up to a 20% rate increase ($46.80/year/EU)
0%	The public may accept up to a 30% rate increase ($50.64/year/EU)
0%	The public may accept up to a 40% rate increase ($54.60/year/EU)

Comments:

- Citizens (including myself) are not willing to pay more because the results so far are not visible or publicized. If we kept $ generated in the (stormwater) utility in the utility, then raising the fee might not be an issue so early on. Call it a tax.
- Depends upon success of education program
- This is a tough question to answer as it depends on:
  - i. Public education
  - ii. How much we capitalize and do with longer term funding (i.e., revenue bonds)
  - iii. What our needs are
- This is not a question for now. Need to first define (program) needs/justifications, and support could follow.
- Based on experience, OWASA settled on not more than 6.25-6.5% annual increase when it got into major CIP.

16. Which statement below better states your thinking?

9% The Chapel Hill Stormwater Program should have responsibility for maintenance and improvements *only* in a public right-of-way (ROW)

91% The Chapel Hill Stormwater Program should have responsibility for maintenance and improvements of conveyance systems in public ROW *and* some level of responsibility for maintenance and improvements of conveyance systems that convey stormwater runoff from public streets and other public areas on or through private property.

Briefly explain why?

- The stormwater system needs to be looked at as a whole.
- We created the problems through a lack of policy direction for so long that it may be necessary to work with property owners to correct problems.
- Need to treat entire system rather than only part of system.
- The distinction is artificial in practicality because all that water runs through the Town of Chapel Hill jurisdiction to Jordan Lake.
- You need to have as broad approach to the problems as possible with respect to all for their good or bad practices.
- Chapel Hill has a record of handling issues beyond public ROWs and citizens either have seen or experienced firsthand, stormwater problems, particularly flooding from the conveyance system, on their properties or in their subdivision. Because they pay a (stormwater) fee, citizens would expect some level of service beyond ROWs.
- It is a system, not individual pieces.
- For now #2 until the program is up and running and stormwater is being addressed more 'at the source' and the public is made aware of this fact – In future #1.
- Individual owners typically lack the knowledge and scale and are not eager to spend their money unless it directly benefits them. This doesn't necessarily apply to clean out by hand.
- Ratepayers need some sense of <u>personal</u> benefit from the program.
- Until we get the Town Manager, Attorney, and Council to understand that once you start on maintenance of areas (that are outside the ROW) then you are legally obligated. <u>Then</u>, maybe go for private property.

17. How important is the Town's Stormwater Management Program to the *Town's Comprehensive Plan*?

Very Important	Important	Not Important
64%	**36%**	**0%**

18. How important do you think it is to *align* the Town's Stormwater Management Program with *regional stakeholder interests*, such as those of TJCOG, Carrboro, OWASA, etc.

Very Important	Important	Not Important
82%	**18%**	**0%**

19. How important do you feel it is to *align* the Town's Stormwater Management Program with *regional stakeholder interests* *if such alignment increased the program cost to Chapel Hill rate payers*?

Very Important	Important	Not Important
45%	**35%**	**20%**

20. Describe the intensity of the following *stormwater-related problems* in Chapel Hill over the last five to ten years:

	Increased	Decreased	Stayed the Same	Don't know
Drainage	46%	9%	18%	27%
Erosion	46%	0%	36%	18%
Flooding	27%	9%	37%	27%
Water Quality	18%	18%	27%	37%

21. What do you believe should be the *most important measures of success* for Chapel Hill's Stormwater Management Program? Please rate the following potential measures or key performance indicators as High (H), Medium (M), or Low (L) with regards to importance in tracking the strategic success of the Town's Stormwater Program:

Potential Measures of Success / Key Performance Indicators	High	Medium	Low
Compliance with state and federal regulatory requirements and reporting	73%	18%	9%
Water quality for receiving streams and lakes within Chapel Hill's jurisdiction	91%	9%	0%
Water quality in the Upper New Hope Arm of Jordan Lake	64%	27%	9%
Reduced flood hazards and flood-related problems within Chapel Hill	73%	27%	0%
Volume of trash & sediment removed from public streets & storm systems	64%	27%	9%
# of enforcement actions taken to reduce and eliminate sources of pollution	30%	70%	0%
# of volunteers involved in local stormwater programs & pollution prevention	50%	41%	9%
# of stormwater capital improvement & drainage assistance projects completed	46%	36%	18%
Linear feet of degraded streams that are stabilized and/or restored	73%	27%	0%
# of sites developed or redeveloped using low impact stormwater practices	64%	27%	9%
Professional development & training programs completed by stormwater staff	27%	55%	18%
# of drainage and pollution complaints received, responded to, and resolved	55%	36%	9%
# of stormwater billing complaints received, responded to, and resolved	64%	27%	9%
Budgeted v. actual expenditures and other financial performance measures for stormwater programs and projects	20%	70%	10%
Regular surveys of citizens and property owners regarding awareness of the stormwater program and level of satisfaction with municipal stormwater services	32%	45%	23%
Development, implementation, tracking, and regular updating of the Master Plan	73%	27%	0%
Level of support and involvement from external and regional stakeholders	40%	40%	20%

Other potential measures of success for the Town's stormwater program?

Stream habitat & morphological assessments (include scouring, sedimentation, etc.

With increase in enforcement, track # of sites in compliance

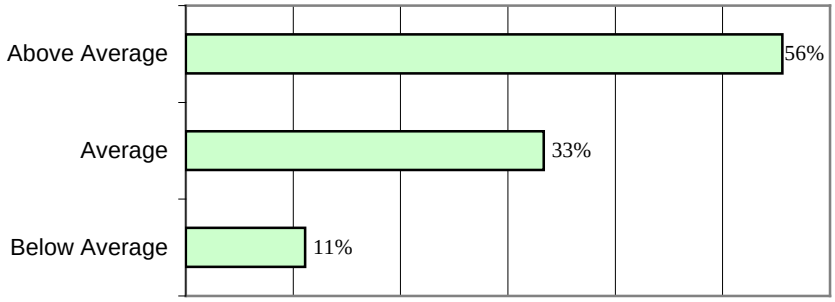
Track # volunteers in terms of residential and business owners participating

Respond and resolve drainage complaints from both a stormwater quantity and stormwater quality perspective

22. Which stormwater services (*existing and/or future services*) provided by the Town do you believe are (or would be) most important and valued from the perspective of residents and property owners (rate payers) in Chapel Hill?

- Public education
- Review of new development projects to require better integration of low impact design that improves water quality
- Take care of localized drainage problems
- Stream restoration
- Pollution monitoring
- Flooding control
- Low impact development
- Clean water
- Trash clean-up
- Mosquito numbers / pests
- Curb appeal that maintains our unique town
- # of drainage and pollution complaints received, responded to, and resolved
- # of stormwater billing complaints received, responded to, and resolved
- Reduced flood hazards and flood-related problems within Chapel Hill
- # of stormwater capital improvement & drainage assistance projects completed
- Drainage assistance
- Stream bank / corridor restoration
- Storm drain stenciling and other high visibility education efforts
- "Branding" for program
- Well-maintained existing structures and stream courses
- Street sweeping
- Specific improvement projects, with visibility and PR
- Development and implementation of plan
- Education "programs," especially to adults
- Increase water quality
- Decrease erosion
- Decrease flooding
- Drainage for my backyard
- Incentives to decrease utility $
- Control runoff
- Meet state/federal standards
- Implement Stormwater Plan
- Capital improvements
- Conduct monitoring for water quality and quantity
- Maintenance and upkeep of streams / drainage systems that have not gotten attention
- Respond to inquiries

23. If the Chapel Hill Stormwater Program was "benchmarked" *today* against other Municipal Stormwater Programs in North Carolina, how do you think it would rate comparatively in terms of total available resources, extent and levels of stormwater services, and use of best management practices?



24. With which statement below do you agree?

- **0%** Construction sites are always well-protected with very little silt or mud leaving the sites.
- **41%** Construction sites are usually well-protected with only minor amounts of silt or mud leaving the sites.
- **41%** Construction sites are sometimes unprotected with large amounts of silt or mud leaving the sites.
- **18%** Construction sites are frequently unprotected with large amounts of silt or mud leaving the sites.
- **0%** Unsure or have not observed

25. How well does the storm drainage system (catch basins, drainage pipes, drainage culverts under roadways, drainage swales and channels, etc.) generally function within Chapel Hill?

- **0%** The storm drainage system works perfectly and handles rainfall with no problems.
- **27%** The storm drainage system seems to work ok in most storms.
- **64%** The storm drainage system occasionally backs up water, floods some streets, and can cause either a short-term nuisance or potentially dangerous flooding.
- **9%** The storm drainage system often fails to work well and is a major public safety concern.
- **0%** Unsure or have not observed.

26. How would you generally <u>rate the maintenance of the storm drainage system</u> (includes catch basins, drainage pipes, drainage culverts under roadways, drainage swales and channels, etc.) within Chapel Hill?

- **10%** The storm drainage system is very clean and very well maintained.
- **30%** The storm drainage system is adequately maintained in most cases.
- **50%** The storm drainage system needs more frequent maintenance.
- **10%** Unsure or have not observed.

27. In a paragraph or less, please describe your *vision* of the most successful Stormwater Management Program for Chapel Hill within the next 10 years:

My vision is very closely aligned with the key principles (or priorities) of the Town of Chapel Hill Stormwater Utility's mission statement.

A high quality service that is strong enough to meet the needs of its citizens. One that ensures no extra loading of pollutants and tries to reduce those we have currently. Stops flooding throughout the town while maintains the "look" of the town.

I hope we are successful in increasing public awareness about stormwater and the ways a citizen can decrease their contribution to both the quantity and quality of stormwater. I hope we are successful in getting citizens and property owners to understand what their utility fee does for them now and what it will do for them in the future.

The most successful stormwater management program for Chapel Hill within the next 10 years will have a comprehensive master plan in place, with the implementation underway, identifying water quality and water quantity needs and working towards all recommended solutions.

I would like to see a stormwater program that approaches the quality of OWASA's program.

That Jordan Lake will be able to serve as a drinking water source. Chapel Hill should be able to document our contribution to keeping the resource sustainable & useful for drinking water purposes.

Public health and safety increases (H_2O quality and flood control) by public awareness and implementation of BMP's as common practice, resulting in drinking water above regulatory standards. Stream water quality increases to support aquatic life. Stormwater is released slow enough for above (1st ½" of rainfall is stored to reduce pollutants including sediment) by having state-of-the-art retention at all new sites and retrofitting large old sites. Flooding and drainage problems subside due to control of major stormwater runoff areas. Stream corridor habitat and morphology restored.

Clear and understandable goals, objectives, and standards of success, as established through the master planning process (which is continuously updated!). Active and visible branded program in the community: tangible on-the-ground projects (e.g., stream segment restoration), visible public education program. Well-defined capital improvements program that follows technical and financial priorities established through the master plan.

The Chapel Hill system will have developed a Master Plan that looks well into the future (~25 years) but has short, mid-term, and long-term strategies for implementation. It will be a true Utility that is separate and apart from other departments and possibly contracts out services to an organization like OWASA.

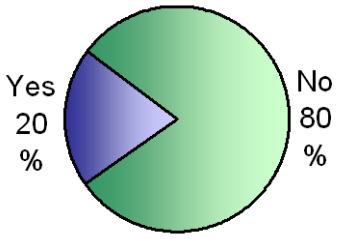
Appendix 5b – Stormwater Staff Survey Results

(5 survey participants employed within Stormwater Management Division)

1. **What is the length of your service as an employee of the Town of Chapel Hill?**

Average: 3.4 years

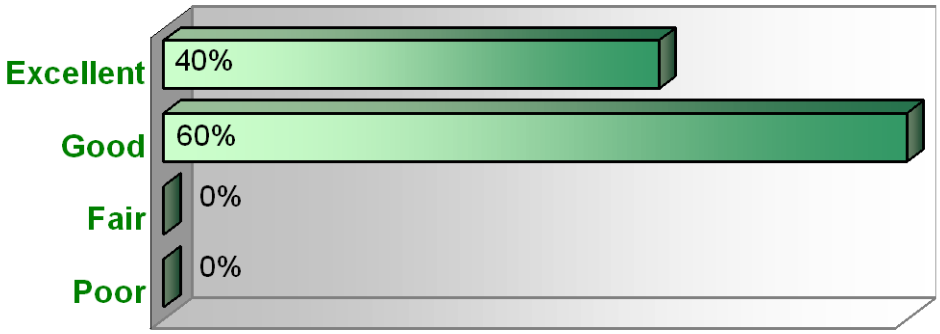
2. **Have you worked in other Departments or Divisions (outside of Engineering / Stormwater Management) during your career with the Town of Chapel Hill?**



If Yes, which other Departments?

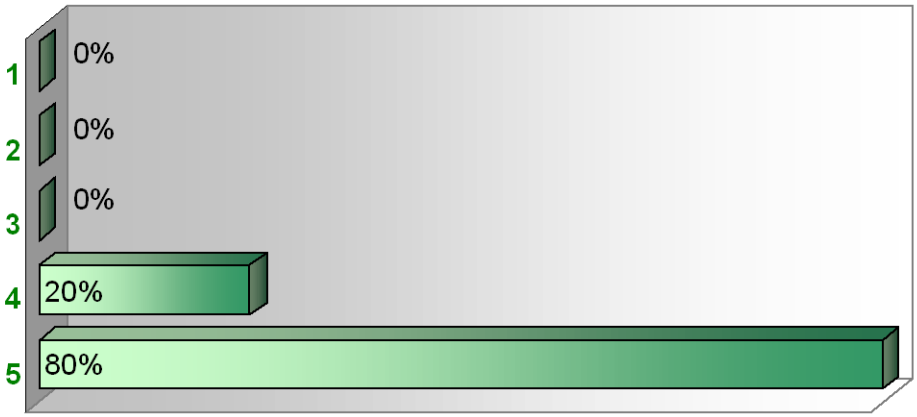
Public Works - Recycling

3. **How would you rate the overall quality of life in Chapel Hill?**



4. **How important do you think protecting the natural environment is to quality of life in Chapel Hill?**

(On a scale from **1** to **5,** where **1 = "Not Important"** and **5 = "Very Important"**)



5. What are the specific Stormwater programs, services, and activities in which you are involved?

Stormwater Management Engineer

Manage the Town's stormwater –related programs – respond to citizens' requests for information and assistance for all things stormwater-related; NPDES Phase II permit activities; compliance with Town's stormwater criteria for development (plan review); water supply watershed requirements; floodplain management; drainage and flooding problems; hazard mitigation plan updates; HMGP; Stormwater Advisory Board support; TMDLs; utility billing.

Assistant Stormwater Management Engineer – position vacant at time of survey

Stormwater Technician

All water quality issues (Jordan Lake TMDL, illicit discharges, monitoring program, etc.), drainage assistance, GIS/data management, utility billing, stream determinations/RCD, storm sewer mapping, hazard mitigation, environmental outreach (some).

Environmental Education Coordinator

Plan and implement school programs, community events such as Big Sweep; put together the booth for street fairs; coordinate volunteers from the high schools, RSVP, UNC and Town; develop educational material/handouts; work with the media; update the Stormwater website; answer main phone line and link callers with staff member who can help them. Work with "regional partners" who have common goals and education focus.

Accounting Technician

Handle the billing for the stormwater fee. Calculate the square footage of impervious surface for properties based on GIS data and certificate of occupancy.

Stormwater Intern

Conduct water quality sampling and maintain water quality database; drafted the Illicit Discharge and Connection Ordinance; continue work on the stormwater infrastructure inventory (GIS); investigate reported discharges to the storm sewer system as well as some reports of citizen drainage problems; reviewed and revised (currently ongoing) water quality monitoring strategy with Stormwater Technician; other miscellaneous staff support tasks.

6. Which Town Stormwater programs and services do you think are most important and valued by citizens and property owners who pay stormwater fees? Why?

Drainage and flooding problem resolution – it's the most visible and readily understandable aspect of the program. Development review and floodplain management – but only as it affects their property.

Most citizens value the drainage assistance program since drainage problems are more visible and can cause property damage. People can't see water quality improvements, and paying customers demand tangible results that fit their idea of value. The priority of water quality over drainage assistance is lost to the micro-economic minded citizen.

Storm sewer system maintenance, drainage assistance – property owners like to minimize property damage due to drainage problems and associated problems (mosquitoes). Town citizens repeatedly tell Council that environmental protection is very important, but don't seem to associate that with the stormwater program.

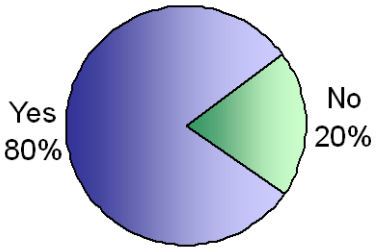
Functioning Infrastructure – drains to keep streets and property from flooding.

Leaf Collection, though method might not be too popular.

Not valued because they don't know about it, but Plan Reviews to prevent stormwater from leaving the site of new development is very important.

7. Can you think of any additional Stormwater programs or services that are not currently offered by the Town of Chapel Hill that may be desirable for the community?

If YES, please list and note why?



FEMA's CRS program – provides flood insurance customers a discount.

Suggest incentives for HOAs and other community organizations to retrofit BMPs to improve water quality. Perhaps a reduced stormwater fee in proportion to community expenses on BMP projects.

NFIP – CRS; otherwise, we offer a lot of services, but only a few are well developed.

Decreased flood insurance rates through the CRS program.

More drainage assistance projects.

Credit program for utility (i.e., reduced fees for BMP placement).

Easier regulations and instructions for landscaping in Resource Conservation District.

8. How do Chapel Hill's citizens and property owners typically contact the Town for assistance with a drainage or stormwater-related question, problem, and/or request for service?

Through phone calls or email – either directly or indirectly (i.e., referred by Town Council member or Town Manager's office).

Mostly – direct calls to Stormwater Staff; sometimes – calls referred from other departments; occasionally – emails and letters.

Only experience is with phone calls.

They usually call Public Works or Stormwater.

9. What are the most common types of stormwater-related inquiries from citizens and property owners?

Drainage and flooding problems; questions about stormwater criteria for development; floodplain questions (Is my house in a floodplain?)

Consultations on the NFIP – FEMA maps are common; stream determinations are also common. The most common inquiries concern development and re-development.

Stream determination requests / also RCD information, information on floodplain / NFIP, drainage problems, other LUMO-related questions.

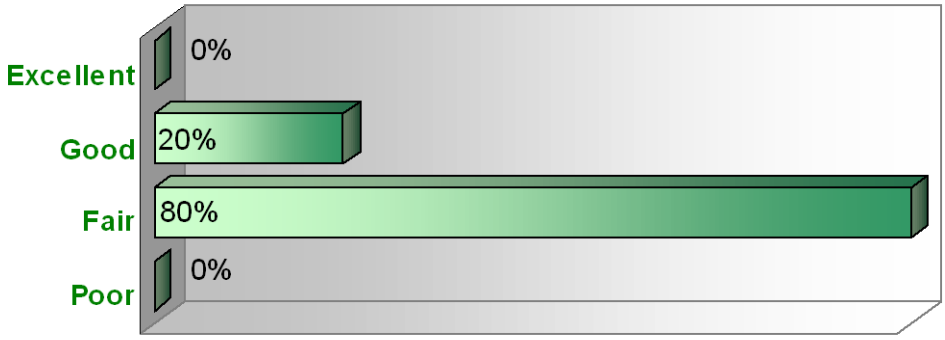
Why do I have to pay this bill? My yard is flooded because drain is clogged.

Right after bills get sent, mostly billing questions.

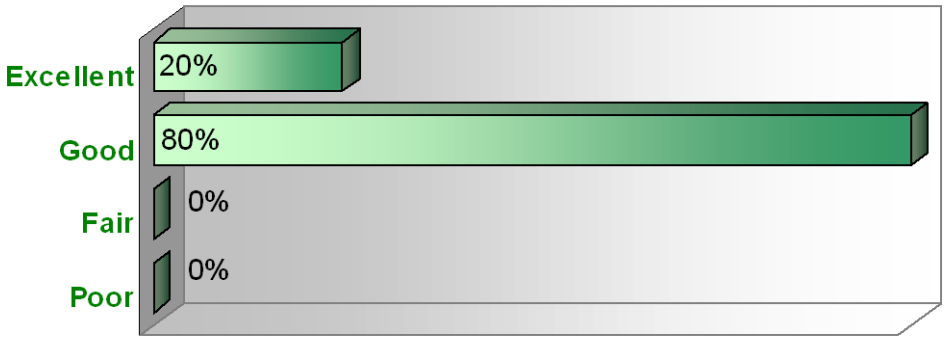
Before or after a hurricane, clogged drains.

More people are starting to call to report erosion and water quality problems.

10. Based on *your current knowledge and opinion*, please rate the overall water quality of the creeks, streams, and lakes in Chapel Hill.



11. How do you think the *typical citizen of Chapel Hill* would rate the overall water quality of local creeks, streams, and lakes?



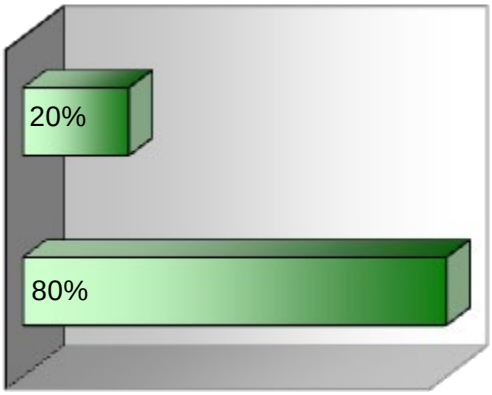
12. Describe the intensity of the following *stormwater-related problems* in Chapel Hill over the last five to ten years. <u>Please check one for each</u>.

Stormwater-related problems	Increased	Decreased	Stayed the Same	Don't Know
Drainage	80%	0%	0%	20%
Erosion	20%	0%	0%	80%
Flooding	40%	0%	20%	40%
Water Quality	20%	20%	20%	40%

13. Which statement below better states your thinking? (Check one)

The Chapel Hill Stormwater Program should have responsibility for maintenance and improvements *only* in a public right-of-way (ROW).

The Chapel Hill Stormwater Program should have responsibility for maintenance and improvements of conveyance systems in public ROW *and* some level of responsibility for maintenance and improvements of conveyance systems that convey stormwater runoff from public streets and other public areas on or through private property.



Comments? (See next page)

The hydrologic system is complex and should be managed in a comprehensive and cumulative fashion. Piece-meal management of parts of the system that are concurrent with the ROW betrays the fundamental nature of hydrology.

The storm sewer networks running through Town were designed without regard to ownership, thus any given storm sewer network will drain right-of-way, cross and drain private property, then cross and drain right-of-way, etc. What happens in the privately-owned sections strongly affects what happens in the publicly-owned sections, and vice versa.

Systems need to be treated as a whole, and especially in troublesome areas on private property, the ROW has some impact, whether small or large.

14. How significant do you think each of the following potential sources of water pollution is to the quality of streams and lakes lying within Chapel Hill?

Potential Sources of Water Pollution	Very Significant	Significant	Not Significant
a. Disposal and discharges from commercial operations	25%	**50%**	25%
b. Discharges from sewage treatment plants	20%	**40%**	**40%**
c. Pollutants that are deposited from the atmosphere	20%	**80%**	0%
d. Runoff from parking areas and streets	**60%**	40%	0%
e. Runoff from farms and agricultural operations	20%	20%	**60%**
f. Runoff from forested or undeveloped land areas	0%	20%	**80%**
g. Runoff from developed residential land areas	40%	**60%**	0%
h. Runoff from commercial land areas	**80%**	20%	0%
i. Runoff from construction sites or disturbed land areas	40%	**60%**	0%
j. Stream bank erosion	**60%**	40%	0%
k. Oil, grease, household chemicals, and other wastes disposed of in storm drains or natural areas by residents	20%	**80%**	0%
l. Accidental spills of industrial and/or commercial chemicals	20%	20%	**60%**
m. Discharges from septic tanks or septic systems	**40%**	20%	**40%**
n. Discharges from sanitary sewer pipes/systems	**40%**	**40%**	20%
o. Litter	25%	**50%**	25%
p. Waste matter from wildlife	**50%**	25%	25%
q. Leaking landfills	25%	25%	**50%**
r. Leaking Underground Storage Tanks	**50%**	25%	25%
s. Improper use of fertilizers	**40%**	**40%**	20%

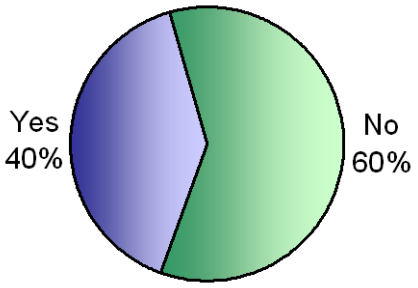
15. Of all the above possible sources of water pollution, please select and rank those which *you* think are the six largest sources of pollution within Chapel Hill.

(Circle or bold the letter for the **"top six sources"** and then rank those six from **#1 - #6**, with #1 being what you think is the largest source of water pollution.)

Percentage Who Ranked Given Source in Top 6	
a. Disposal and discharges from commercial operations	- %
b. Discharges from sewage treatment plants	20%
c. Pollutants that are deposited from the atmosphere	40%
d. Runoff from parking areas and streets	80%
e. Runoff from farms and agricultural operations	20%
f. Runoff from forested or undeveloped land areas	- %
g. Runoff from developed residential land areas	60%
h. Runoff from commercial land areas	80%
i. Runoff from construction sites or other disturbed land areas	60%
j. Stream bank erosion	80%
k. Oil, grease, household chemicals, and other wastes disposed of in storm drains or natural areas by residents	20%
l. Accidental spills of industrial and/or commercial chemicals	20%
m. Discharges from septic tanks or septic systems	20%
n. Discharges from sanitary sewer pipes/systems	20%
o. Litter	20%
p. Waste matter from wildlife	20%
q. Leaking landfills	- %
r. Leaking Underground Storage Tanks	20%
s. Improper use of fertilizers	20%

16. Are you aware of any other <u>potential sources</u> of water pollution to receiving streams and lakes in Chapel Hill that are not listed above in #15?

If YES, please list and describe?



Exotic invasive plant species can disrupt habitat in riparian ecosystem. Nutrients and resulting algae are problematic.

Pig farm off Piney Mountain / Shady Lawn (grandfathered in – don't know if it still exists)

Homeless Encampments (Public Works moved a big one last year)

Mobile restaurants / caterers (i.e., Chinese fry oil dumped in Tom's Creek)

17. The Town Council has approved the following Stormwater Program Mission (Core Purpose) and 10 Program Priorities.

Stormwater Program Mission

"It is the mission of the comprehensive Stormwater Management Program to:

- protect the health and safety of both the public and the ecosystem,
- address both stormwater quality and stormwater quantity concerns, and
- meet or exceed federal and state mandates regarding stormwater."

Avg. Rank	Program Priorities
3.4	Develop and implement a comprehensive Stormwater Program Master Plan that supports all of the stormwater program priorities.
3.6	Define the level of service and performance standards for the Town's Stormwater Program.
3.6	Address stormwater quality as an integral function within the program.
3.8	Ensure compliance with federal and state regulatory mandates.
5.2	Integrate programs to utilize resources efficiently.
5.4	Develop a formal public education and involvement program.
5.8	Address stormwater quantity (flooding) as an integral component within the program.
6.0	Protect and restore natural stream corridors.
8.4	Establish an understanding of the stormwater system as a "utility."
8.6	Establish clear stormwater program leadership that the public recognizes.

18. Please review and rate each of the following as either a Strength (3), a Positive with room for improvement (2), or a Weakness (1) of the CURRENT Chapel Hill Stormwater Management Program.

Avg. Rating	Element of Program	Comments
2.6	Environment of openness and desire for input from stakeholders	
1.2	Public awareness and acceptance of the stormwater fee	Citizens are generally not happy with the fee because they don't understand watershed concepts.
2.0	Volunteer involvement in stormwater pollution prevention programs	No regular volunteer opportunities; only event based opportunities (Big Sweep, etc.).
2.0	Support for the program from Town Management	We'll find out
2.3	Support for the program from the elected Town Council	
1.6	Appropriate level of staff resources to implement the program	
1.6	Appropriate level of financial resources to implement the program	Have utility, but still have limits as well.
1.3	Performance indicators for stormwater programs and projects	Would like to see project specific monitoring.
2.8	Compliance with state and federal regulatory requirements	Think we meet / exceed requirements.
1.3	Linkage of the stormwater program to the Town's Comprehensive Plan	(Weakness), but comments have been submitted to Planning.
1.6	Stormwater system maintenance services	The maintenance crew needs to be under Engineering.
2.6	Customer service on billing and other stormwater utility questions	Great service!
1.0	Fee crediting program with incentives for enhanced stormwater management	Not even a discussion yet.
1.3	Stormwater capital improvement programs	More programs = better community response.
1.4	Drainage assistance programs for residents and property owners	More available funds would help to alleviate citizen complaints on utility fee with visible results. Need more staff and $.
2.0	Local water quality sampling and monitoring programs	Program could be more comprehensive and more goal-oriented. Again, visible improvements. Need to refine scope and reasons and add stormwater testing and pesticides and petroleum testing.
2.8	Stormwater management requirements for new development and redevelopment within the Town's jurisdiction	
2.3	Control of erosion and sediment from construction and land disturbances	County could use more inspectors.
2.5	Leverage of local stormwater resources to seek external grant opportunities	
3.0	Participation in the "Clean Water Education Partnership" under TJCOG	

19. What other STRENGTHS not listed above (in # 18) do you see in the current Town Stormwater Management Program?

Fortunate to be working with a tremendous group of people. Staff is extremely smart, dedicated, and very good at what they do. Also working with a dedicated group of people on the Stormwater Advisory Board.

Staff keep up with current science and technology, new issues in stormwater management.

Cooperation with other local governments, state programs and departments, non-profit groups.

Highly motivated, creative staff.

An entire division with staff having specialties and certifications.

20. What other WEAKNESSES or DEFICIENCIES not listed above (in #18) do you see in the current Town Stormwater Management Program?

We lack authority to enforce and investigate violation of state and federal water quality laws. Also, BMP opportunities have been lost due to stakeholder resistance to program.

Lack of coordination and communication between departments.

Insufficient authority for program manager to organize all stormwater-related resources, activities, and people.

Program priorities not yet clear.

Once we are fully staffed, it will be better. We need to do more one-on-one and face-to-face outreach as in homeowner.

21. What do you believe are the most significant and important <u>accomplishments</u> of the Town's Stormwater Management Program to date?

Website; Launch of Master Plan; Public education and information – we've participated in community events (e.g., Apple Chill, FestiFall); organized participation in NC Big Sweep; created education programs and made presentations in schools and after-school programs; created brochures and giveaways; produced radio spot.

Minimizing runoff quality and quantity from development and re-development through ordinance is very important. Most significant accomplishment has been the partnership with EPA, DWQ, EEP, Town of Carrboro, and other stakeholders to participate in the EPA's priority watershed program.

Getting the utility started and fee system running mostly smoothly.

Getting a buyout grant for Camelot Village condos.

Improving plan review process, responsiveness.

LOTS of educational materials, school involvement, NC Big Sweep organization, great outreach program.

Creating the utility.

Billing system, QAQC.

Developing an active education program.

Interacting with regional stakeholders.

Plan reviews.

22. What do you believe are the most significant and important <u>challenges</u> facing the Town's Stormwater Management Program?

Staffing; demonstrating results; continuing efforts elsewhere to impose numeric effluent standards for stormwater; changing regulations.

Sufficient staff will be needed to successfully implement the terms of our NPDES permit. Public education and involvement will be a major challenge.

Time-lapse between requests for assistance and Program response should be improved. Justifying utility fee will be a challenge without education and strategic programs.

Reconciling goals and priorities that may conflict.

Fully integrating activities carried out by Public Works.

Revising local ordinances to be achievable, understandable, enforceable and helping citizens abide by them easily.

Addressing damage to streams in very high density, older parts of Town.

Getting funding to meet program goals, or altering goals to match funding.

Addressing coordination problems with other departments.

Addressing flooding issues around Eastgate and Camelot Village.

Meeting Jordan Lake TMDL requirements.

Public and private property re: storm drain issues.

Keeping fees low enough to do what we need to do, but not to be onerous for property owners.

Water quality of Jordan Lake also depends on Chatham County's action.

Testing for the "right stuff" in out streams.

23. What do you believe should be the *most important measures of success* for Chapel Hill's Stormwater Management Program?

Please rate the following potential measures or key performance indicators as High (H), Medium (M), or Low (L) with regards to importance in tracking the success of the Town's Stormwater Program.

	High	Medium	Low
Compliance with state and federal regulatory requirements and reporting	**80%**	20%	0%
Water quality for receiving streams and lakes within Chapel Hill's jurisdiction	**75%**	25%	0%
Water quality in the Upper New Hope Arm of Jordan Lake	25%	**75%**	0%
Reduced flood hazards and flood-related problems within Chapel Hill	**80%**	20%	0%
Volume of trash & sediment removed from public streets & storm systems	**60%**	20%	20%
Number of enforcement actions taken to reduce and eliminate sources of pollution	25%	**50%**	25%
Number of volunteers involved in local stormwater programs & pollution prevention	0%	**75%**	25%
Number of stormwater capital improvement & drainage assistance projects completed	25%	**50%**	25%
Linear feet of degraded streams that are stabilized and/or restored	25%	**75%**	0%
Number of sites developed or redeveloped using low impact stormwater practices	0%	**75%**	25%
Professional development & training programs completed by stormwater staff	0%	0%	**100%**
Number of drainage and pollution complaints received, responded to, and resolved	50%	50%	0%
Number of stormwater billing complaints received, responded to, and resolved	25%	**50%**	25%
Budgeted v. actual expenditures and other financial performance measures for stormwater programs and projects	33%	33%	33%
Regular surveys of citizens and property owners regarding awareness of the stormwater program and level of satisfaction with municipal stormwater services	**50%**	25%	25%
Development, implementation, tracking, and regular updating of the Master Plan	**50%**	25%	25%
Level of support and involvement from external and regional stakeholders	25%	**50%**	25%

**Other potential measures of success for the Town's stormwater program? Please list, if any:

Routine maintenance plan for drains

24. Construction sites in Chapel Hill are _____?

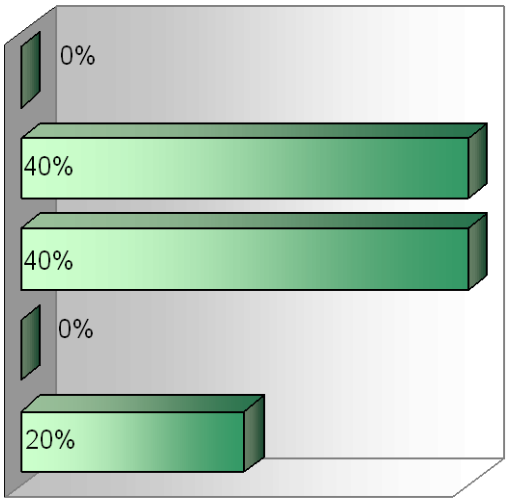
…always well-protected with no dirt or mud leaving the sites. 0%

…usually well-protected with only minor amounts of dirt or mud leaving the sites. 40%

…sometimes unprotected with large amounts of dirt or mud leaving the sites. 40%

…often unprotected with large amounts of dirt or mud leaving the sites. 0%

…don't know 20%



25. How well does the <u>storm drainage system</u> (catch basins, drainage pipes, drainage culverts under roadways, drainage ditches and channels, etc.) generally function within Chapel Hill?

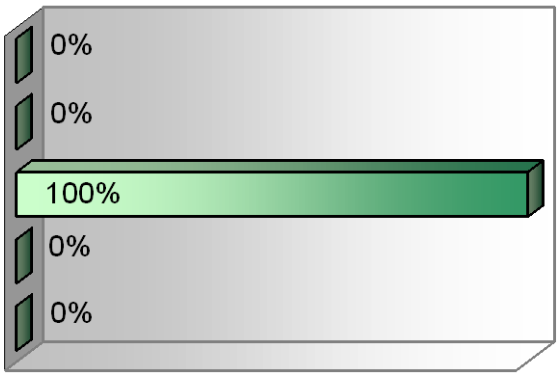
Works very well with no problems. 0%

Seems to work ok in most storms. 0%

Occasionally backs up water, floods some streets, and can cause either a short-term nuisance or potentially dangerous flooding 100%

Often fails to work well and is a major public safety concern. 0%

Don't know 0%



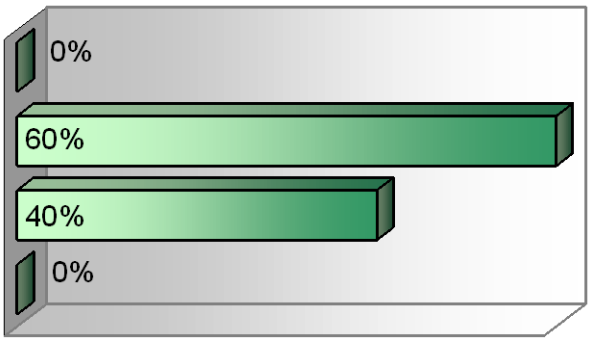
26. How would you generally <u>rate the maintenance of the storm drainage system</u> (includes catch basins, drainage pipes, drainage culverts under roadways, drainage swales and channels, etc.) within Chapel Hill?

Very clean and very well maintained 0%

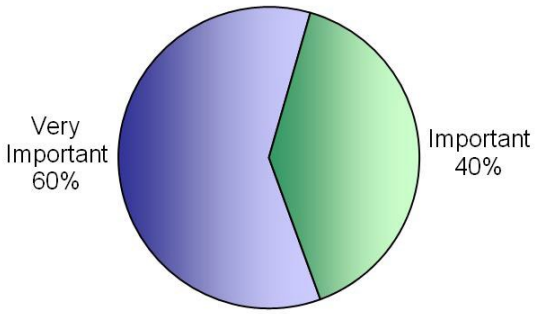
Adequately maintained in most cases 60%

Needs more frequent maintenance 40%

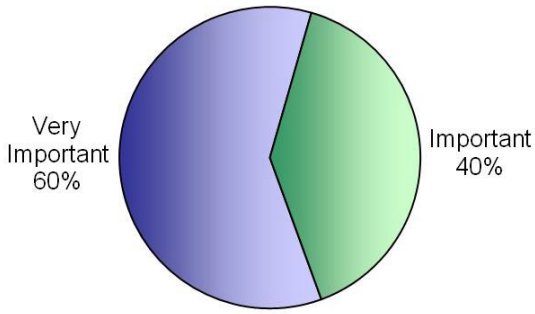
Unsure or have not observed 0%



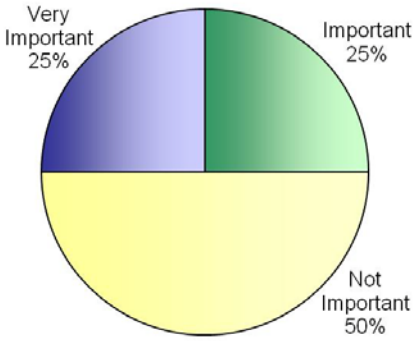
27. How important is the Town's Stormwater Management Program to the *Town's Comprehensive Plan*?



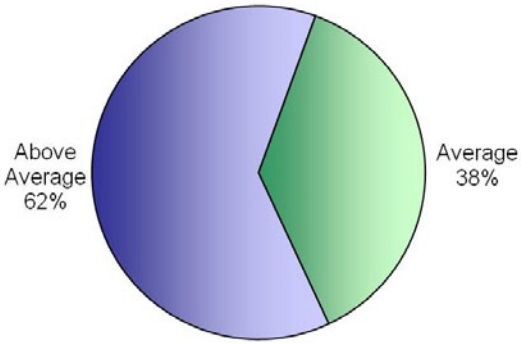
28. How important do you think it is to *align* the Town's Stormwater Management Program with *regional stakeholder interests*, such as those of TJCOG, Carrboro, OWASA, etc.



29. How important do you feel it is to *align* the Town's Stormwater Management Program with *regional stakeholder interests* *<u>if such alignment increased the program cost to Chapel Hill rate payers</u>*?



30. If the Chapel Hill Stormwater Program was "benchmarked" *today* against other Municipal Stormwater Programs in North Carolina, how do you think it would rate comparatively in terms of total available resources, extent and levels of stormwater services, and use of best management practices?

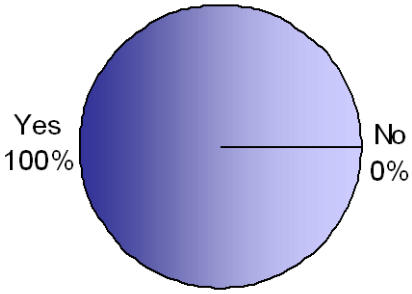


Comments:

Stormwater management is a relatively new concept in NC, except in coastal counties, so many municipalities in NC would be below average.

Above average, compared to Phase II communities; average compared to Phase I communities which have 10 years advantage.

31. Do you feel that it would be helpful for Town employees to receive more information and training on the stormwater regulations, requirements, and programs?



If YES, how should other Town Departments be prioritized to receive stormwater education and training?

All departments should receive basic information about stormwater program and what/how they can help; more detailed training for departments that have critical roles.

Inspections should receive intensive stormwater training; Public Works would be next; Fire department; basically prioritized by their level of exposure to issues that fall under Stormwater Management's jurisdiction.

1. Planning – affects implementation of stormwater regulations and ordinances; can create other regulations and ordinances that undermine stormwater.
2. Inspections – affects enforcement of stormwater regulations and ordinances
3. Public Works – critical to coordinated stormwater management activity.

Planning Department first, as regulations are very confusing, even to staff! Manager and Council also need to understand issues clearly and be prepared for tweaks and additions to ordinances and development requirements/plans.

32. Please describe your *vision* of the most successful Stormwater Management Program for Chapel Hill within the next 10 years:

A Stormwater Management Program in which…

-we're no longer having to justify our existence

-we're considered a successful example of how to implement and manage stormwater programs

-the stormwater master plan has been completed and is being successfully implemented and updated

-we're seeing real improvements in water quality and stream habitats

-we're discussing stream segments that can be removed from the 303(d) list of impaired waters

-we have sufficient drainage crews and equipment and have an honest-to-goodness preventative maintenance program

-we're successfully managing construction contracts for drainage assistance and CIP construction projects

-we would become a CRS participant under NFIP and a Class 1 community

-we've removed all structures from the floodway and are using future conditions flood mapping, and the land and stream restored

-the downtown area, including the historic district, would have upgraded drainage systems, with all tap-ins, broken pipes, etc. fixed and functioning well

-parking lots and sidewalks in the downtown area would be pressure washed with suction collection of water on at least a bi-monthly basis to remove the nasties and sediment

-all storm drains and culverts that are undersized for today's Chapel Hill would be replaced with properly sized drains

-all neighborhoods would have designated storm drains labeled, and doorhangers distributed

-the most damaged stream banks would be restored and stabilized

-the Town would continue to purchase conservation areas, but keep some of them closed to the public where the stream and natural habitat are or could be negatively impacted

-the Stormwater Program would work with Parks & Recreation to erect interpretive signs along the greenways regarding creek habitat, critters, and human impact

-parking lots with consistent runoff problems would be retrofitted with drain filters or other BMP filtering devices, and be well maintained

-businesses with potentially harmful runoff (gas stations, bus washing areas) would be eligible for grants to install BMPs

-the Town would have a pooper scooper ordinance, an ordinance to make illicit discharges down a storm drain, onto a road, or into streams a chargeable offense

-the Planning Department would have construction and RCD requirements that are more easily understood and implemented, with no hassle for riparian habitat improvements

-curb and gutter projects would be replaced with LID where appropriate; the Town's ordinances, design plans, and Comprehensive Plan would incorporate LID and BMPs

-riparian buffers would be treated to mitigate invasive species of plants, and buffers would be planted according to BMP recommendations; property owners would be able to receive grants for this effort with the pledge to maintain the buffers

-the Town would have a credit system for schools and businesses and multi-family housing developments using stormwater BMPs, with inspections on an annual or bi-annual basis

-public art incorporating stormwater runoff (fountains, waterfalls, etc.) would beautify and enchant all residents of and visitors to Chapel Hill

-the history project on Chapel Hill creeks would be finished and on display around town

-buildings with green roofs, rain gardens, and water features would be common; we will have a walking tour downtown of stormwater and sustainability BMPs

-every citizen would be a stream steward and would be aware of the educational resources the Town offers; the Town would have a Stream Steward decal for mail box stands to reward "smart" yard and home care

-there would be no litter, and fewer vehicles on the roads; the Town would be exceptionally pedestrian and bike friendly

-each resident and property owner would receive beautiful, informative, and exciting newsletters twice a year, and everyone would read it cover to cover

-many publications would be printed in coordination with NCSU, Cooperative Extension, and Chapel Hill Historical Society

-we would start the first Master Stormwater Program (like the Master Gardener Program of Cooperative Extension) and use trained volunteers for outreach efforts

-utility billing would come in-house and bills would be sent with information about the stormwater program and resources enclosed; they would be easily understood

-leaf collection would be weekly so that storm drains would not be blocked and subject to large loads of leaf litter

-development would be smart so that we don't get so many drainage complaints from new development

-the master plan would be finished and provide workplans for the next 15 years

-there would be no hurricanes in our area

-staff would have Sue plus two more engineers, an illicit discharge specialist, a Trish, a Wendy and a Lauren, a grants coordinator, and a volunteer coordinator

-the State would cite Chapel Hill as a Best Water Community

-everyone would love the Stormwater Staff and not mind paying their stormwater fees

-has a fairly complete inventory of the stormwater network and stormwater BMPs in town that is well-maintained where it works properly or modified to a design with less environmental impact where there are drainage / erosion problems

-has a well-funded Drainage Assistance Program

-is actively installing BMPs to restore natural hydrology and filter pollutants, and has an active stream restoration program

-has cooperative agreements with OWASA, UNC, Carrboro, Durham & Orange County for nutrient management

-has active citizen involvement in stream watches, cleanup, monitoring, etc.

-has made LID or LEED required in new development and redevelopment

-a very progressive program that has sound strategies for addressing all aspects of stormwater management

-water quality would be paramount in this vision, with ecologic and riparian restoration the primary devices of water quality

-program would have the legal standing and authority to address the entire range of responsibilities under NPDES and LUMO

-program should educate citizens to the point where they understand the importance of their own actions in conjunction with ours in addressing stormwater quality and quantity

-the staff would be larger, possibly an inspector and another technician once we get some of our ongoing programs in place

-we would have an in-house water quality lab where we would perform basic constituent testing

-new facilities

-greater public presence with an ongoing volunteer program, rather than individual event-specific programs

33. Please share any other *comments, suggestions, observations, etc.* regarding the Chapel Hill Stormwater Management Program:

-The Program needs more power (ordinance),more people, and a clear strategy for managing the wide range of stormwater issues facing us today and in the future.

-There are several stormwater-related activities and practices done by Town staff, some of them standing engineering practices, that may be interfering with efforts to improve biological integrity or water quality of streams – these should be reviewed.

-LUMO requirements are difficult and lengthy, even for simple homeowner DIY projects – am concerned this is undermining stream protection by encouraging people to avoid seeking Zoning Compliance Permits altogether.

-Public Works' drainage crews are "serving two masters" – makes accountability very difficult.

-The Stormwater Program has been tasked with Hazard Mitigation Planning, but it is disconnected from the Comprehensive Plan and all Emergency Response.

Appendix 5c – Manager's Office Survey Results

(2 survey participants from Town Manager's Office)

1. **What is the length of your service as an employee of the Town of Chapel Hill?**

   21 years average

2. **How would you rate the overall quality of life in Chapel Hill?**

   ☐ **Excellent** ☐ Good ☐ Fair ☐ Poor

   100%

3. **How important do you think protecting the natural environment is to quality of life in Chapel Hill?**

   (On a scale and circle from **1** to **5,** where **1 = "Not Important"** and **5 = "Very Important"**)

   1 2 3 4 5

   100%

4. **Based on *your current knowledge and opinion*, please rate the overall water quality of the creeks, streams, and lakes in Chapel Hill.**

   ☐ Excellent ☐ **Good** ☐ **Fair** ☐ Poor

   50% 50%

5. **How do you think the *typical citizen of Chapel Hill* would rate the overall water quality of local creeks, streams, and lakes?**

   ☐ Excellent ☐ **Good** ☐ **Fair** ☐ Poor

   50% 50%

6. **What are the most common types of stormwater-related inquiries from citizens and property owners?**

   - Spot flooding – intersection and backyard variety
   - Pollution concerns – something in a stream or catch basin – seen or perceived
   - Rising water during major rain events – stream surcharges
   - Flooding coming off right-of-way
   - Water backing up due to blockage in drain pipes
   - Creeks coming out of banks

7. Please rank the significance of each of the following potential sources of water pollution to water quality of creeks, streams, and lakes in Chapel Hill?

Please check one for each below. ("Runoff" is the rainfall or snow melt that runs off the ground, roofs, roads, lawns, fields, and other land surfaces in Chapel Hill.)

Potential Sources of Water Pollution	Very Significant	Significant	Not Significant	Don't Know
a. Sewage treatment plants	-	50%	50%	-
b. Pollutants (like acid rain) that fall from the sky	-	50%	50%	-
c. Runoff from parking areas and streets	-	100%	-	-
d. Runoff from farms	50%	-	50%	-
e. Runoff from forested or undeveloped land	-	-	100%	-
f. Runoff from residential development	-	100%	-	-
g. Runoff from commercial development	50%	50%	-	-
h. Runoff from construction sites	50%	50%	-	-
i. Stream bank erosion	-	100%	-	-
j. Oil, grease, household chemicals, trash, and other wastes illegally dumped in storm drains or ditches	-	25%	75%	-
k. Fuel or chemical spills	-	25%	75%	-
l. Leaks from septic systems	-	-	100%	-
m. Leaks or spills from sanitary sewer systems	-	25%	75%	-
n. Improperly applied fertilizers and pesticides	-	50%	50%	-

8. Are you aware of any other potential sources of water pollution to receiving streams and lakes in Chapel Hill that are not listed above in #7?

☐ Yes ☐ No
100%

9. Which Town Stormwater programs and services do you think are most important and valued by citizens and property owners who pay stormwater fees? Why?

- Basic maintenance – keeping basins and pipes working
- Facility improvements – pipe extensions, area improvements that reduce likelihood of localized flooding

These are things they see and that affect them immediately – water quality is valued but not as visible.

- Quantity control: keeping water off of private property
- Ensuring proper and sufficient carrying capacity for pipes, drainage ditches to prevent structural damage to private development

10. Can you think of any additional Stormwater programs or services that are not currently offered by the Town of Chapel Hill that may be desirable for citizens and property owners?

☐ Yes ☐ No
50% 50%

If YES, please list and note why?

-Stream restoration in major corridors (long-term)

11. What do you believe are the most significant and important accomplishments of the Town's Stormwater Management Program to date?

-Creating dialogue and awareness of water quality; dedicated funding to ongoing maintenance and improvements to system

-Establishment of utility, billing system; beginning of a systematic program to replace ad hoc responses

12. What do you believe are the most significant and important challenges facing the Town's Stormwater Management Program?

-Funding ongoing and future operations; balancing development pressures with need to mitigate runoff effects

-Funding needed to make needed public improvements

-Establishing effective enforcement techniques

13. The Town Council has approved the following Stormwater Program Mission (Core Purpose) and 10 Program Priorities.

Stormwater Program Mission

"It is the mission of the comprehensive Stormwater Management Program to:

- protect the health and safety of both the public and the ecosystem,
- address both stormwater quality and stormwater quantity concerns, and
- meet or exceed federal and state mandates regarding stormwater."

Please rank the relative importance of the 10 Program Priorities. Place "1" in front of the Program Priority that you believe is *most important* to help advance the Program Mission and Purpose, "2" for the Program Priority that is the *next most important,* and so on up to "10" for the Program Priority that is the *10th most important*.

Program Priorities (Rank from #1 – #10)

5.5 Develop and implement a comprehensive Stormwater Program Master Plan that supports all of the stormwater program priorities.

4.5 Address stormwater quantity (flooding) as an integral component within the program.

3.5 Address stormwater quality as an integral function within the program.

2.0 Protect and restore natural stream corridors.

6.5 Develop a formal public education and involvement program.

8.5 Define the level of service and performance standards for the Town's Stormwater Program.

3.0 Ensure compliance with federal and state regulatory mandates.

7.0 Establish clear stormwater program leadership that the public recognizes.

8.0 Integrate programs to utilize resources efficiently.

6.5 Establish an understanding of the stormwater system as a "utility."

14. Please review and rate each of the following as either a Strength (3), a Positive with room for improvement (2), or a Weakness (1) of the CURRENT Chapel Hill Stormwater Management Program. If you Don't Know, simply place N/A in the rating column for the given program element.

Rating	Element of Program	Comments
2.0	Environment of openness and desire for input from stakeholders	
1.0	Public awareness and acceptance of the stormwater fee	
N/A	Volunteer involvement in stormwater pollution prevention programs	
3.0	Support for the program from Town Management	
2.0	Support for the program from the elected Town Council	
2.0	Appropriate level of staff resources to implement the program	except enforcement
1.5	Appropriate level of financial resources to implement the program	
2.0	Performance indicators for stormwater programs and projects	
2.5	Compliance with state and federal regulatory requirements	
2.0	Linkage of the stormwater program to the Town's Comprehensive Plan	
2.0	Stormwater system maintenance services	
2.0	Customer service on billing and other stormwater utility questions	
N/A	Fee crediting program with incentives for enhanced stormwater management	
1.0	Stormwater capital improvement programs	
1.5	Drainage assistance programs for residents and property owners	
3.0	Local water quality sampling and monitoring programs	
3.0	Stormwater management requirements for new development and redevelopment within the Town's jurisdiction	
2.5	Control of erosion and sediment from construction and land disturbances	
2.0	Leverage of local stormwater resources to seek external grant opportunities	
2.0	Participation in the "Clean Water Education Partnership" under TJCOG	

15. What other STRENGTHS not listed above (in # 14) do you see in the current Town Stormwater Management Program?

- Good, skilled, knowledgeable staff
- Knowledgeable Board

16. What other WEAKNESSES or DEFICIENCIES not listed above (in #14) do you see in the current Town Stormwater Management Program?

- Willingness to support efforts on enforcement have not been demonstrated
- Need to get UNC involved

17. Which statement below better states your thinking? (Check one)

- The Chapel Hill Stormwater Program should have responsibility for maintenance and improvements *only* in a public right-of-way (ROW).

100% The Chapel Hill Stormwater Program should have responsibility for maintenance and improvements of conveyance systems in public ROW *and* some level of responsibility for maintenance and improvements of conveyance systems that convey stormwater runoff from public streets and other public areas on or through private property.

Comments?

- To extent public purposes are involved
- Very limited, only with dedicated easements and defined policies

18. Describe the intensity of the following *stormwater-related problems* in Chapel Hill over the last five to ten years. Please check one for each.

Stormwater-related problems	Increased	Decreased	Stayed the Same	Don't Know
Drainage	50%	50%	-	-
Erosion	50%	50%	-	-
Flooding	50%	50%	-	-
Water Quality	100%	-	-	-

19. What do you believe should be the *most important measures of success* for Chapel Hill's Stormwater Management Program?

Please rate the following potential measures or key performance indicators as High (H), Medium (M), or Low (L) with regards to importance in tracking the success of the Town's Stormwater Program. If you Don't Know, respond N/A for the given potential measure or key performance indicator.

High	Medium	Low	
100%	-	-	Compliance with state and federal regulatory requirements and reporting
100%	-	-	Water quality for receiving streams and lakes within Chapel Hill's jurisdiction
50%	50%	-	Water quality in the Upper New Hope Arm of Jordan Lake
50%	50%	-	Reduced flood hazards and flood-related problems within Chapel Hill
-	100%	-	Volume of trash & sediment removed from public streets & storm systems
50%	-	50%	# of enforcement actions taken to reduce and eliminate sources of pollution
-	50%	50%	# of volunteers involved in local stormwater programs & pollution prevention
-	100%	-	# of stormwater capital improvement & drainage assistance projects completed
100%	-	-	Linear feet of degraded streams that are stabilized and/or restored
50%	50%	-	# of sites developed or redeveloped using low impact stormwater practices
-	50%	50%	Professional development & training programs completed by stormwater staff
-	-	100%	# of drainage and pollution complaints received, responded to, and resolved
-	-	100%	# of stormwater billing complaints received, responded to, and resolved
-	100%	-	Budgeted v. actual expenditures and other financial performance measures for stormwater programs and projects
-	100%	-	Regular surveys of citizens and property owners regarding awareness of the stormwater program and level of satisfaction with municipal stormwater services
50%	-	50%	Development, implementation, tracking, and regular updating of the Master Plan
-	100%	-	Level of support and involvement from external and regional stakeholders
-	-	-	**Other potential measures of success for the Town's stormwater program?

**Please list, if any: N/A

20. Construction sites in Chapel Hill are _____?

- \- always well-protected with no dirt or mud leaving the sites.
- 50% usually well-protected with only minor amounts of dirt or mud leaving the sites.
- 50% sometimes unprotected with large amounts of dirt or mud leaving the sites.
- \- often unprotected with large amounts of dirt or mud leaving the sites.
- \- don't know

21. How well does the <u>storm drainage system</u> (catch basins, drainage pipes, drainage culverts under roadways, drainage ditches and channels, etc.) generally function within Chapel Hill?

- \- Works very well with no problems.
- 50% Seems to work ok in most storms.
- 50% Occasionally backs up water, floods some streets, and can cause either a short-term nuisance or potentially dangerous flooding
- \- Often fails to work well and is a major public safety concern.
- \- Don't know

22. How would you generally <u>rate the maintenance of the storm drainage system</u> (includes catch basins, drainage pipes, drainage culverts under roadways, drainage swales and channels, etc.) within Chapel Hill?

- \- Very clean and very well maintained
- 100% Adequately maintained in most cases
- \- Needs more frequent maintenance
- \- Unsure or have not observed

23. How important is the Town's Stormwater Management Program to the *Town's Comprehensive Plan*?

☐Very Important ☐ Important 100% ☐Not Important

24. How important do you think it is to *align* the Town's Stormwater Management Program with *regional stakeholder interests*, such as those of TJCOG, Carrboro, OWASA, etc.

☐Very Important ☐ Important 100% ☐Not Important

25. How important do you feel it is to *align* the Town's Stormwater Management Program with *regional stakeholder interests* *<u>if such alignment increased the program cost to Chapel Hill rate payers</u>*?

☐Very Important ☐ **Important 100%** ☐Not Important

26. Do you feel that it would be helpful for Town employees to receive more information and training on the stormwater regulations, requirements, and programs?

☐ **Yes 100%** ☐ No

27. Please describe your *vision* of the most successful Stormwater Management Program for Chapel Hill within the next 10 years:

- Strong Master Plan with clearly stated goals that focus on water quality.
- Planned and budgeted (and funded!) improvements program – focusing on realistic goals.
- Strong maintenance program with adequate resources.
- Overall program meshing with regional programs to protect streams and Jordan Lake.
- Good level of citizen awareness and good cooperation and good citizenship by businesses and developers.
- Stable revenue base of utilities
- General public acceptance of fees and program
- Effective enforcement and general compliance so enforcement penalties or other steps are kept to a minimum
- University participation

28. Please share any other *comments, suggestions, observations, etc.* regarding the Chapel Hill Stormwater Management Program:

N/A

Appendix 5d – Town Council Survey Results

(2 Town Council Members responded to the Stormwater Master Planning Survey)

1. **How long have you lived in Chapel Hill?** **16.5 years average**

2. **How long have you served as an elected Council member for the Town of Chapel Hill?**
   7 years average

3. **How would you rate the overall quality of life in Chapel Hill.**

   ☐ Excellent **50%** ☐ Good **50%** ☐ Fair ☐ Poor

4. **How important is Chapel Hill's natural environment in your measure of quality of life?**

   (Please use a scale and circle from **1** to **5,** where **1 = "Not Important"** and **5 = "Very Important"**)

   1 2 3 4 5 (100%)

5. **Based on *your current knowledge and opinion*, please rate the overall water quality of the creeks, streams, and lakes in Chapel Hill.**

   ☐ Excellent ☐ Good **50%** ☐ Fair **50%** ☐ Poor

6. **How do you think the *typical citizen of Chapel Hill* would rate the overall water quality of local creeks, streams, and lakes?**

   ☐ Excellent ☐ Good **100%** ☐ Fair ☐ Poor

7. **What are the most common types of stormwater-related inquiries from citizens and property owners that you are aware of?**

   Flooding of lots during heavy rain and the quality of runoff sent to Jordan Lake.

   Flooding and erosion.

8. Please rank your perception of each of the following potential sources of water pollution to water quality of creeks, streams, and lakes in Chapel Hill?

Please check one for each below. ("Runoff" is the rainfall or snow melt that runs off the ground, roofs, roads, lawns, fields, and other land surfaces in Chapel Hill.)

Potential Sources of Water Pollution	Very Significant	Significant	Not Significant
a. Sewage treatment plants		50%	50%
b. Pollutants (like acid rain) that fall from the sky		100%	
c. Runoff from parking areas and streets	100%		
d. Runoff from farms			100%
e. Runoff from forested or undeveloped land			100%
f. Runoff from residential development		100%	
g. Runoff from commercial development	50%	50%	
h. Runoff from construction sites	50%	50%	
i. Stream bank erosion	50%	50%	
j. Oil, grease, household chemicals, trash, and other wastes illegally dumped in storm drains or ditches		100%	
k. Fuel or chemical spills	50%		50%
l. Leaks from septic systems		50%	50%
m. Leaks or spills from sanitary sewer systems		50%	50%
n. Improperly applied fertilizers and pesticides	50%	50%	

9. Which Town Stormwater programs and services do you think are most important and valued by citizens and property owners who pay stormwater fees? Why?

Drainage; water quality; and restoration.

Drainage assistance; maintenance of stormwater controls.

10. What do you believe are the most significant and important accomplishments of the Town's Stormwater Management Program to date?

Creation of Management Plan, and public education plan following establishment of the stormwater fee.

Organization and getting the work done for the master plan to be complete in '08.

11. What do you believe are the most significant and important <u>challenges</u> facing the Town's Stormwater Management Program?

$ $ $ $.

Continued public education.

12. Describe your perception of the intensity of the following *stormwater-related problems* in Chapel Hill over the last five to ten years. <u>Please check one for each</u>.

Stormwater-related problems	**Increased**	**Decreased**	**Stayed the Same**	**Don't Know**
Drainage	50%	50%		
Erosion	50%	50%		
Flooding	50%	50%		
Water Quality		50%	50%	

13. Town Council has approved the following Stormwater Program Mission and 10 Program Priorities.

<u>Stormwater Program Mission</u>

"It is the mission of the comprehensive Stormwater Management Program to:

- protect the health and safety of both the public and the ecosystem,
- address both stormwater quality and stormwater quantity concerns, and
- meet or exceed federal and state mandates regarding stormwater."

Please rank the relative importance of the 10 Program Priorities. Place "1" in front of the Program Priority that you believe is *most important* to advance the Program Mission, "2" for the Program Priority that is the *next most important*, and so on up to "10" for the Program Priority that is the *10th most important*.

Stormwater Program Priorities (Average Rankings for Survey Respondents)

1.0 Develop and implement a comprehensive Stormwater Program Master Plan that supports all of the stormwater program priorities.

5.5 Address stormwater quantity (flooding) as an integral component within the program.

6.5 Address stormwater quality as an integral function within the program.

3.5 Protect and restore natural stream corridors.

6.5 Develop a formal public education and involvement program.

2.0 Define the level of service and performance standards for the Town's Stormwater Program.

6.0 Ensure compliance with federal and state regulatory mandates.

8.0 Establish clear stormwater program leadership that the public recognizes.

6.0 Integrate programs to utilize resources efficiently.

10.0 Establish an understanding of the stormwater system as a "utility."

14. Which statement below better states your thinking? (Please check one only)

____The Chapel Hill Stormwater Program should have responsibility for maintenance and improvements *only* in a public right-of-way (ROW).

100% The Chapel Hill Stormwater Program should have responsibility for maintenance and improvements of conveyance systems in public ROW *and* some level of responsibility for maintenance and improvements of conveyance systems that convey stormwater runoff from public streets and other public areas on or through private property.

Comments?

Seems like in order to correct old errors we need to consider some work on private property.

15. Construction sites in Chapel Hill are _____?

(Please select one answer below)

- ☐ …always well-protected with no dirt or mud leaving the sites.
- ☐ …usually well-protected with only minor amounts of dirt or mud leaving the sites.
- ☐ …sometimes unprotected with large amounts of dirt or mud leaving the sites. **(50%)**
- ☐ …often unprotected with large amounts of dirt or mud leaving the sites. **(50%)**
- ☐ …don't know

16. How well does the <u>storm drainage system</u> (catch basins, drainage pipes, drainage culverts under roadways, drainage swales and channels, etc.) <u>generally function within Chapel Hill</u>?

(Please select one answer below)

- ☐ Works very well with no problems.
- ☐ Seems to work ok in most storms.
- ☐ Occasionally backs up water, floods some streets, and can cause either a short-term nuisance or potentially dangerous flooding **(100%)**
- ☐ Often fails to work well and is a major public safety concern.
- ☐ Don't know

17. How would you generally <u>rate the maintenance of the storm drainage system</u> (includes catch basins, drainage pipes, drainage culverts under roadways, drainage swales and channels, etc.) within Chapel Hill?

- ☐ Very clean and very well maintained
- ☐ Adequately maintained in most cases **(50%)**
- ☐ Needs more frequent maintenance **(50%)**
- ☐ Unsure or have not observed

18. What do you believe should be the *most important measures of success* for Chapel Hill's Stormwater Management Program?

Please rate the following potential measures or key performance indicators as High (H), Medium (M), or Low (L) with regards to importance in tracking the success of the Town's Stormwater Program. If you Don't Know, respond N/A for the given potential measure or key performance indicator. (Actual survey responses provided)

H, M_____ Compliance with state and federal regulatory requirements and reporting

H, H _____ Water quality for receiving streams and lakes within Chapel Hill's jurisdiction

H, M_____ Water quality in the Upper New Hope Arm of Jordan Lake

H, H_____ Reduced flood hazards and flood-related problems within Chapel Hill

H, M_____ Volume of trash & sediment removed from public streets & storm systems

M, M_____ # of enforcement actions taken to reduce and eliminate sources of pollution

L, L_____ # of volunteers involved in local stormwater programs & pollution prevention

M, M_____ # of stormwater capital improvement & drainage assistance projects completed

H, L_____ Linear feet of degraded streams that are stabilized and/or restored

H, M_____ # of sites developed or redeveloped using low impact stormwater practices

M, L_____ Professional development & training programs completed by stormwater staff

M, M_____ # of drainage and pollution complaints received, responded to, and resolved

M, L_____ # of stormwater billing complaints responded to and resolved

H, H_____ Budgeted v. actual expenditures and other financial performance measures for stormwater programs and projects

M, L_____ Regular surveys of citizens and property owners regarding awareness of the stormwater program and level of satisfaction with municipal stormwater services

M, L_____ Development, implementation, tracking, and regular updating of the Master Plan

M, M_____ Level of support and involvement from external and regional stakeholders

Yes_____ Other potential measures of success for the Town's stormwater program?

Water quality testing results.

[For Questions #19 - 21, please use a scale and circle from **1** to **5,** where **1 = "Not Important"** and **5 = "Very Important"**] **(Average response provided)**

19. How important is the Town's Stormwater Management Program to the *Town's Comprehensive Plan*? (4.5)

1 2 3 4 X 5

20. How important do you think it is to *align* the Town's Stormwater Management Program with *regional stakeholder interests*, such as those of TJCOG, Carrboro, OWASA, etc. (3.75)

1 2 3 X 4 5

21. How important do you feel it is to *align* the Town's Stormwater Management Program with *regional stakeholder interests* *if such alignment increased the program cost to Chapel Hill rate payers*? (3.5)

1 2 3 X 4 5

22. Please describe your *vision* of the most successful Stormwater Management Program for Chapel Hill within the next 10 years:

It's very important to bring our regional partners into the program – Carrboro, UNC, and to some extent more coordination with Durham and Chatham County. A successful program will limit the impact of flooding, and ensure only the highest water quality runoff. The program will be understood and appreciated by the citizenry. Development projects will comply with runoff standards. Measures of quantity and quality of runoff will exceed federal standards.

Well-documented programs which are funded and implemented…. We can't do everything, but pick a few projects and do them well. Clear expectations.

---

23. Please share any other *comments, suggestions, observations, etc.* regarding the Chapel Hill Stormwater Management Program:

Do better surveys – this is way too much to expect from folks!

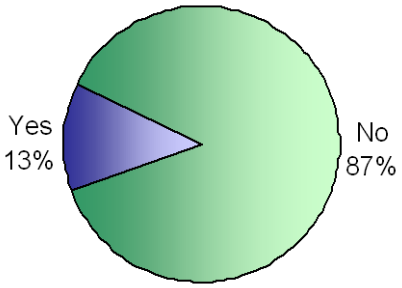
Appendix 5e – Department Head and Senior Staff Survey

(39 Town department head and senior staff survey participants)

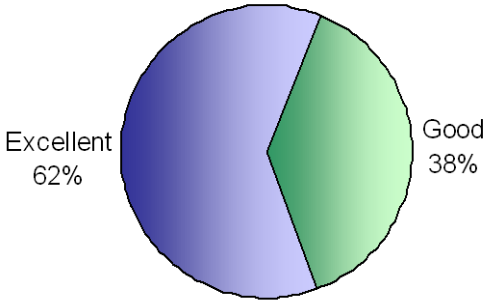
1. What is the length of your service as an employee of the Town of Chapel Hill?

Department (# of survey participants)	Engineering (4)	Finance (3)	Housing (1)	Human Resources (2)	Inspections (3)	Library (1)	Manager's Office (2)	Parks & Recreation (2)	Planning (9)	Police (2)	Public Works (8)	Transit (2)	**Overall (39 survey participants)**
Average Number Years of Service	22.3	5.7	23.0	2.7	12.3	20.0	1.8	17.0	8.8	25.0	12.2	2.3	**11.8**

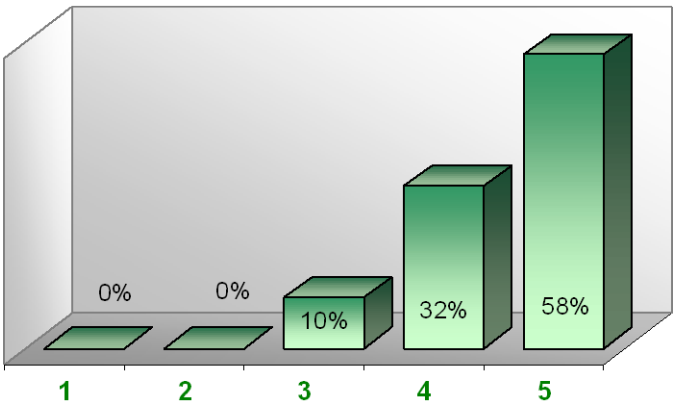
2. Have you worked in other Departments during your employment with the Town of Chapel Hill?



3. How would you rate the overall quality of life in Chapel Hill?



4. How important do you think protecting the natural environment is to quality of life in Chapel Hill? (On a scale from **1** to **5,** where **1 = "Not Important"** and **5 = "Very Important"**)



5. To the best of your knowledge, how would you rate the overall water quality of the creeks, streams, and lakes in Chapel Hill?

	Engineering	Finance	Housing	Human Resources	Inspections	Library	Manager's Office	Parks & Recreation	Planning	Police	Public Works	Transit	**Overall**
Excellent	-	-	-	-	100%	100%	-	-	12%	-	12%	-	**14%**
Good	100%	100%	100%	100%	-	-	100%	100%	44%	100%	88%	100%	**74%**
Fair	-	-	-	-	-	-	-	-	44%	-	-	-	**12%**
Poor	-	-	-	-	-	-	-	-	-	-	-	-	**0%**

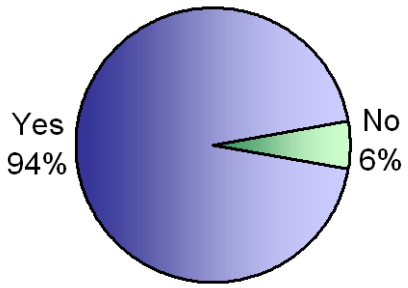
6. Town-wide, how serious are drainage and flooding problems from stormwater runoff?

(On a scale from **1** to **5,** where **1 = "Not a Serious Problem"** and **5 = "Very Serious Problem"**)

	Engineering	Finance	Housing	Human Resources	Inspections	Library	Manager's Office	Parks & Recreation	Planning	Police	Public Works	Transit	**Overall**
Average Ranking	3.5	N/A	3.0	3.0	4.0	N/A	4.0	3.5	3.6	3.5	3.0	4.0	**3.4**

Don't know: **18%**

7. Are you aware that property owners in Chapel Hill pay a stormwater fee to fund stormwater programs and services provided by the Town?



8. What are the most common types of stormwater-related inquiries from citizens and property owners that you are aware of, if any?

Engineering

Typically, complaints and requests-for-assistance relate to drainage problems on or affecting private property. A second category of calls involve notification of a problem in stream or drainageway (e.g. foam or discoloration in a stream).

Drainage off construction sites

Finance

What is "impervious?"

Inspections

Erosion control inquiries/complaints.

Erosion control

Manager's Office

Questions regarding impervious surface area as it relates to billing, and flood map inquiries for insurance

Concerns about flooding; runoff from impervious surfaces; concern about contaminants in runoff

Parks & Recreation

Flooding

What are my taxes going for – how are they helping citizens?

Planning

Complaints about stormwater runoff coming from neighboring properties.

Complaints and questions about stormwater program fees!

What can I do about my neighbors' runoff running onto my property?

What can I build in the Resource Conservation District?

Flooded property

Private property damage associated with stormwater runoff between adjacent residential properties

RCD and floodlines

Flooding after heavy rain; stream determinations

Bus service

Resource Conservation Districts; required stormwater devices

Police

Can I develop my property without running afoul of stormwater management?

Public Works

Loose leaves (yard waste in gutters)

Localized flooding

Removal of impediments to free flow of water at selected locations

Flooding

Questions from builders of single-family residences, re: level spreaders, etc.

Maintenance of ditches/intermittent streams.

Property damage

What will the Town do about water running on or through my property?

Transit

Flooding issues at the Camelot apartments (across from University Mall). Some run-off issues from Newton Drive.

Why do the streets flood? Water floods my property.

9. Which Town Stormwater programs and services do you think are most important and valued by citizens and property owners? Why?

Engineering

Citizens generally value visible improvements and prompt responses to their requests-for-assistance, rather than water quality work being accomplished behind the scenes and/or concurrently with the more visible improvements being done.

What stormwater program, cleaning CI and line and ditchlines and driveway pipes appears to be who make the most noise or is the most affluent

Remedying chronic drainage/flooding problem areas

Finance

Storm drain maintenance, flood mitigation

Housing

Keeping storm drains clean to prevent back-up of water and flooding of parking lots and back yards

Human Resources

Regular maintenance of stormwater drains to avoid property damage

Maintenance of open and free-flowing storm drains to assure that residential and commercial properties are not damaged

To protect safety of roads and sidewalks for use by citizens

Inspections

Keeping the sewer system functioning to prevent flooding

Cleaning out catch basins

Library

Preserving natural spaces; but in a heavy rain, the focus would shift quickly to drainage and flooding.

Manager's Office

While a key concern focuses on water quality and efforts to stem pollution, property owners may be more worried about flooding and damage to private property.

Drainage Assistance Program and Hazard Mitigation and Disaster Response because these are the most likely to affect residents – drainage problems and weather events.

Parks & Recreation

Prevent flooding, repair drainage issues, stream improvement

Planning

Dissemination of FEMA floodplain boundaries to property owners, realtors, and builders. Clearly to keep folks out of harms way and to warn potential property buyers about the risks associated with the floodplain.

Stream determinations – requirement prior to development

Viewing of maps; reviewing of floodplain issues

Drainage improvements; water detention; stream restorations

Resource Conservation District because it is an easy way for citizens to affect size of development and it is new and seems to be very comprehensive to them.

Police

Keeping storm drain systems clear and flowing freely. Stopped up storm drains are seen as a major source of flooding. Ensuring construction-related erosion is kept in check.

Not familiar with the programs and services other than erosion control and maintenance of downstream watershed protection, both of which are highly valuable.

Public Works

Drainage assistance program. The Town helps educate the resident and helps with part of the cost of the repair.

Reliable, scheduled street cleaning (largely for aesthetics)

Efficient/effective response during flooding events (for smooth traffic/pedestrian movement and safety).

Voluntary stream clean ups.

Keeping the infrastructure in good working condition.

Assessment of property in regards to fees.

Most would put emphasis on street drainage facilities, because most don't have drainageways in their yards/private property.

Proper maintenance and upkeep of drainage system – flood control – pollution prevention and monitoring – drainage assistance – public education – street sweeping – mosquito control.

The Town's response to inquiries such as water not flowing in my ditch (ROW); quick response time to complaints.

Transit

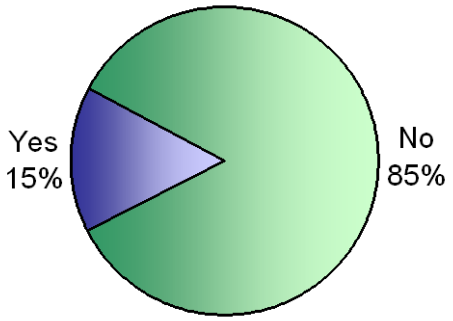
The flooding mitigation projects along the greenways are of value to our citizens. The services that handle the run-off from construction locations is also important to local property owners.

Not sure what programs there are.

10. Please rank the significance of each of the following potential sources of water pollution to water quality of creeks, streams, and lakes in Chapel Hill?

Potential Sources of Water Pollution	Very Significant	Significant	Not Significant	Don't Know
a. Sewage treatment plants	30%	**32%**	27%	11%
b. Pollutants (like acid rain) that fall from the sky	5%	**45%**	39%	11%
c. Runoff from parking areas and streets	32%	**55%**	13%	0%
d. Runoff from farms	32%	14%	**38%**	16%
e. Runoff from forested or undeveloped land	3%	8%	**83%**	6%
f. Runoff from residential development	25%	**67%**	8%	0%
g. Runoff from commercial development	28%	**66%**	3%	3%
h. Runoff from construction sites	**52%**	42%	3%	3%
i. Stream bank erosion	8%	**62%**	24%	6%
j. Oil, grease, household chemicals, trash, and other wastes illegally dumped in storm drains or ditches	34%	**39%**	16%	11%
k. Fuel or chemical spills	24%	21%	**37%**	18%
l. Leaks from septic systems	29%	13%	**42%**	16%
m. Leaks or spills from sanitary sewer systems	**35%**	29%	18%	18%
n. Improperly applied fertilizers and pesticides	32%	**39%**	13%	16%

11. Are you aware of any other potential sources of water pollution to receiving streams and lakes in Chapel Hill that are not listed above in #10?



Emptying chlorinated swimming pool water into streams
Runoff from UNC-owned and operated property
Tropical storms
Pollutant fallout from the Cogeneration Plant
Fertilizers and pesticides applied to golf courses
Organic – natural bacteria, etc.

12. To what degree do the Town's Stormwater goals, programs, and services have an impact or bearing upon the goals, programs, and services of your Department?

(On a scale from **1** to **5,** where **1 = "No Impact"** and **5 = "Very High Impact"**)

	Engineering	Finance	Housing	Human Resources	Inspections	Library	Manager's Office	Parks & Recreation	Planning	Police	Public Works	Transit	**Overall**
Average Ranking	4.5	3.0	N/A	2.0	3.3	N/A	3.5	3.0	4.3	2.5	4.4	3.0	**3.7**

Don't know: **15%**

In what ways? How may the Stormwater Program best support and help advance the goals of your Department?

Engineering

As one of three primary divisions in the department, the success of the stormwater program is integral and critical to the successful function of the entire department.

Hopes are that there will be improvement to existing stormwater system

Maintaining new construction

Finance

Communication and cooperation

Human Resources

Provide safe access to facilities

Maintaining open and safe access to facility for employees and visitors

Inspections

One stormwater program is OK.

Our department enforces that their regulations are followed in relation to permitting.

Library

The upcoming library expansion project in Pritchard Park has already raised important stormwater management issues. Given that, Chapel Hill's program should enhance the visitors' experience when visiting the library.

Manager's Office

By telling the story of this program, we can promote awareness of government services, engender support for Town endeavors and depict the Town as dedicated to providing quality service.

Continue to provide information to citizens via the website and public service announcements.

Parks & Recreation

Cooperative projects related to streams, open space, parks, trails, etc.

Impact through capital project development and renovation of existing

Planning

Meet with us to clearly explain the Stormwater program and to discuss how we can work together to advance mutual goals.

Planning Department supports all town goals and objectives.

Assist to minimize the effect of stormwater on current and future development.

Continue to work with staff in implementation of goal and objectives of the Town comprehensive land use plan.

Education – establish guidelines and mitigation techniques which address development impacts, new and existing.

Continue communication on practices and changes.

All development is filtered through a stormwater lens.

Police

Roadway and residential flooding has an effect on police services.

Public Works

Training and educating the workers

We have one division that operationally is devoted to on-going stormwater maintenance (and parts of other divisions)

Voluntary clean up programs

The stormwater program has been very active and helpful in dealing with a stormwater runoff issue at the Meadowmont soccer fields.

Clarify regulations, assist with operational issues – prequalify contractors that do work that impacts or may impact stormwater

Maintenance by stormwater affects other Town facilities (streets, greenways) that Public Works is responsible for. Communication and cooperation helps us work together.

Continue good working relationship on common goals and services – funding through utility fees – educational program – information exchange relative to system condition

Transit

Controlling flooding

Our department must be able to provide public transportation to all neighborhoods in our community. Run-off that affects the street network has a direct impact on our services. If an event happens that would impact our system – it would be important for the Stormwater Program to contact us.

How may your Department best support and help advance the goals of the Stormwater Program?

Engineering

Recognition of the significance of Stormwater Management and the need to comply with increasing regulatory controls will help ensure that adequate resources are allocated to the Stormwater Division.

Assisting construction oversight

Establish a master plan for using the stormwater fund money

Institutional memory

Finance

AIR, financial reporting

Housing

Keeping the storm drains in the public housing areas clean and not using pesticides

Human Resources

Support the staff in recruitment and retention of employees, maintaining effective compensation and benefits programs

Provide support for staff with good benefits and compensation and increase awareness about the importance of stormwater

Inspections

Continue to enforce the state building code

Continue current enforcement measures

Library

During the expansion project the stormwater management folks will be invited to review plans to ensure compliance and support.

Manager's Office

By directing citizen inquiries to the department and informing the public of information available on the website

By disseminating news (not only public education) that tells how the program is improving the community

Parks & Recreation

Cooperative projects

Planning

Keep working closely with Stormwater staff and make sure that stormwater plans are created and adhered to

Consultation and coordination of development review and plan making

Continue to help Stormwater staff understand how planning projects interact with stormwater management

By working together

Information sharing. Periodic meetings.

Police

Provide real time information on flooding problems

Public Works

By working together for the same goal

Continue to protect the health and safety of the public and the ecosystem through performing in-house and contract system maintenance and capital projects - - use of department-wide resources to meet peak and critical needs

Communication and cooperation

We pay fees that help fund the program.

Involve the stormwater program upfront in projects during the planning stage

Being good stewards of the environment

Use of most effective/efficient operational practices and services

Continued education and knowledge of the stormwater program

Transit

If during the course of our service, we experience or see a problem associated with stormwater, we should communicate our information to the Stormwater staff.

We can properly dispose of oils, cleaners, etc.

13. What do you believe are the most significant and important <u>accomplishments</u> of the Town's Stormwater Management Program to date?

Launching the master planning effort; providing comprehensive development review to ensure compliance with regulations; obtaining updated floodplain mapping.
Creation of the stormwater utility
Control of runoff from new residential development with better technical review that we now have; increase maintenance
The fact that it exists, and awareness campaign
Establishing the utility to support the function and educating the citizens on its value
Providing information to the public
Public awareness
Getting the plan in place. It required citizen time and Council approval.
Establishment of the Hazard Mitigation and Disaster Response to protect citizen safety and property
The program is still in its infancy - the accomplishment lies in establishing its systems, staff, fees, goals, etc.
Focus on construction issues
Continued drinkable water
Getting started
The requirement and monitoring of stormwater devices
Townwide assessment of impervious surface and creation of corresponding GIS data
Flood control; erosion control at construction sites
Worked on the Eastgate drainage project; Developed fee system to pay for the services; Work to be in compliance with State and Federal regulations
Implementing the town's stormwater management program – getting public approval
Establishment of the utility fee NPDES compliance – master planning – public education
Have been impressed with the stream classification procedures.
Creating an organization and logo that the citizens associate with stormwater protection for the Town of Chapel Hill
Developing stormwater fees; controlling erosion
Creation of program as enterprise fund operation, with sound fee structure
Reducing flood hazards and problem throughout Chapel Hill
The project along Bolin Creek floodway was a significant success

Don't know: **33%**

14. What do you believe are the most significant and important challenges facing the Town's Stormwater Management Program?

Dealing with the proposed TMDL limits for nutrients entering Jordan Lake; successfully completing the Camelot Village buyouts using grant monies; implementing requirements for NPDES permit.

Monitoring new construction of stormwater quality facilities

Deciding which projects will provide the best benefits

The ability to restore the failing storm drainage system and completing replacements

Volume

Clear interpretation of the regulations

Reasonable regulations

Getting people to accept it as a utility, and to pay for it as a utility

Increased runoff due to development and funding

Money

Maintaining all of the small stormwater devices on residential lots

Making retrofits and restorations

Maintaining, monitoring existing private and public stormwater infrastructures devices

Managing stormwater devices on single-family lots

Good water quality

Convincing the public that they are getting something significant for the stormwater funds

Continuing to keep public opinion on the positive about paying a stormwater fee Mr. & Mrs. Tax (fee) Payer want to see where their dollar goes.

Sufficient financial support – timely completion of master plan – timely funding of capital projects

Public education

Managing the program in such a manner as to insure that property owners are not faced with excessive financial burdens

Convincing the population that a fee is not a tax

Flood prone areas that exist

Sufficient funding/resources to establish and maintain state-of-the-art system

Educating the public, stream quality and erosion control

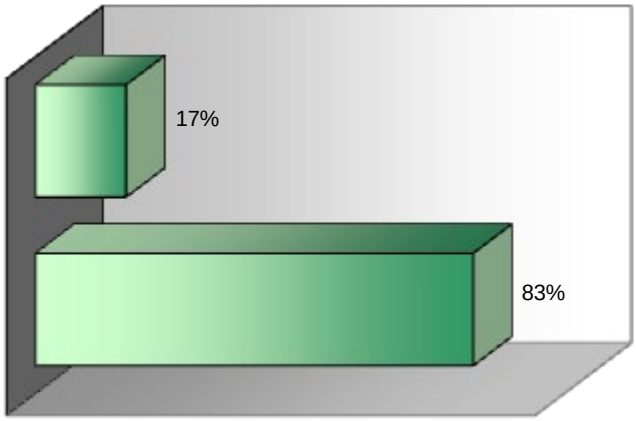
Construction stormwater management; UNC drainage issues

Don't know: **23%**

15. Which statement below better states your thinking?

The Chapel Hill Stormwater Program should have responsibility for maintenance and improvements *only* in a public right-of-way (ROW).

The Chapel Hill Stormwater Program should have responsibility for maintenance and improvements of conveyance systems in public ROW *and* some level of responsibility for maintenance and improvements of conveyance systems that convey stormwater runoff from public streets and other public areas on or through private property.



Comments?

The Town's drainage assistance program should be expanded and funded to allow more cost-sharing small improvement projects that involve public stormwater affecting private property. This would not be a give-away…but would be a cost-sharing plan between citizens and the program to achieve mutual benefits from the improvement(s).

Through cooperation with landowners only

Again: reasonable

Seems to me that if it is going to work at all, it needs to be a Town-wide effort.

Public money should firstly be spent on public facilities before private improvements – okay if it facilitates private improvements

It's all connected. It doesn't make sense to tax and subdivide the system that produces and transports runoff.

Would not want this to turn into something onerous for property owners.

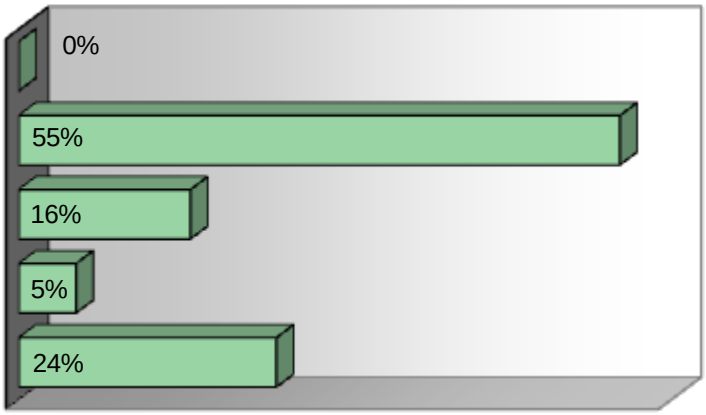
Public policy decision

The Town needs to be sure the whole drainage system works properly.

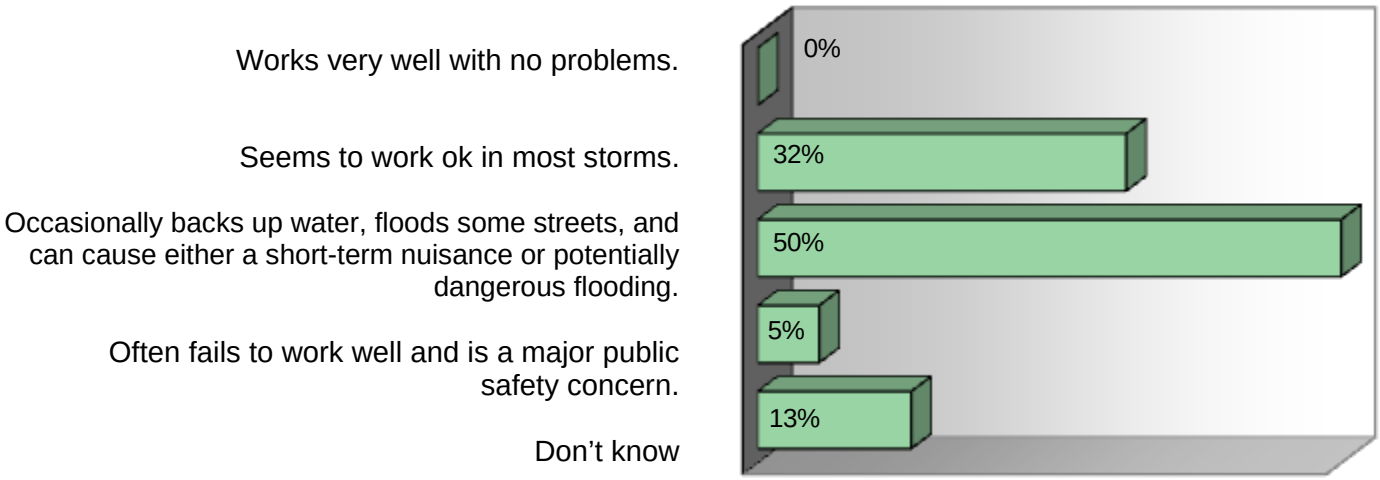
Including UNC

Approach limited only to ROW areas results in too much reliance on non-public compliance.

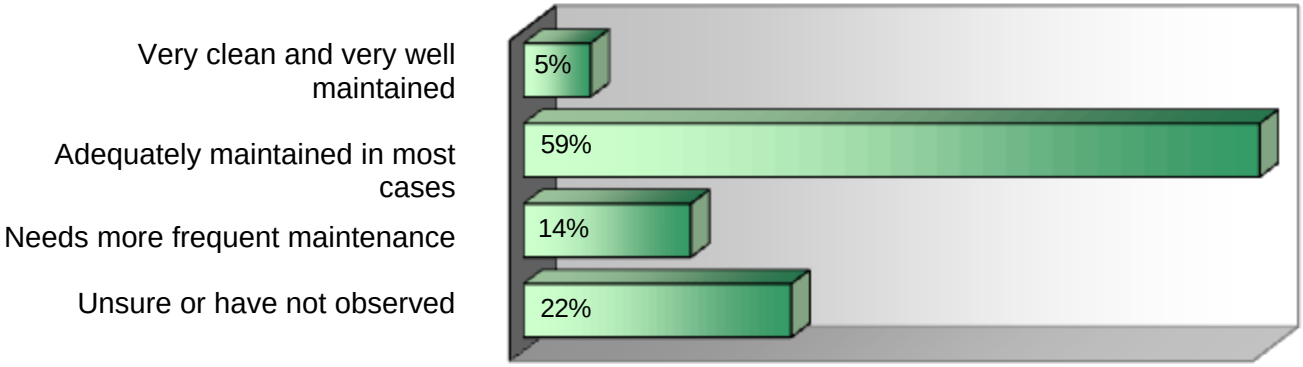
16. Construction sites in Chapel Hill are:



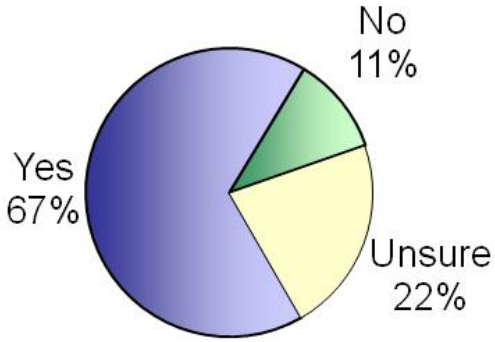
17. How well does the <u>storm drainage system</u> (catch basins, drainage pipes, drainage culverts under roadways, drainage ditches and channels, etc.) generally function within Chapel Hill?



18. How would you generally rate the maintenance of the storm drainage system (includes catch basins, drainage pipes, drainage culverts under roadways, drainage swales and channels, etc.) within Chapel Hill?



19. Do you feel that it would be helpful for Town employees to receive more information and training on the stormwater regulations, requirements, and programs?



If Yes, what type of stormwater information and training would be most helpful for your Department?

It is critical for Planning, Public Works and Building Inspections to receive general training in the stormwater management theory, means and measures, and effects of different technologies. This can be accomplished via a combination of in-house training and mandatory attendance at specific classes/seminars.

Not Engineering that needs to receive training

How stormwater management affects the citizens of Chapel Hill

More information about the general purpose of the stormwater management program and uses of the stormwater fees that are paid by citizens and businesses.

Looked on the website and found no "services" listed. Know there is a plan and committed people who believe in it, but just don't know what the staff does. Visuals on the website and for classroom, to help people like me understand.

Employees should have knowledge to direct citizens with inquiries to the appropriate department.

The rules seem confusing to the non-engineer. A basic training session and annual refresher would be helpful.

Information on importance of keeping clean; what citizens can do to help.

Types of stormwater devices, how they work

Staff members in Planning have a general knowledge of the regulations and less knowledge of programs.

Would like to know what are the most significant sources of water pollution and how well stormwater systems function within Chapel Hill.

Basic awareness training; short video program would suffice for majority of employees.

What they do and what the goals are

Giving a quick review about what a stormwater utility is – goals.

Good housekeeping

Spill clean up, mitigation of vandalism, etc.

What are the "best practices" on a construction site

Training/materials addressing both system overview (e.g., goals, objectives) and operational challenges

Stormwater maintenance

Maybe an informational flier could be produced that would highlight important signs to look for regarding potential stormwater hazards.

20. Please share any other *comments, suggestions, questions, observations, etc.* regarding the Town of Chapel Hill Stormwater Management Program:

Although entered the utility implementation with a mindset for jumping on capital improvements right away, have refocused toward solid master planning to better identify needs and prioritizing work. This is a good way to go provided citizens will continue to accept the less aggressive launch of the utility.

Currently bonds are posted to the Town (via the Engineering Department) for erosion control and water quality ponds in the protected watershed. Wonder if these bonds would be more efficiently maintained and monitored under Stormwater.

We need to add additional review staff for the review of residential single family development so that other key staff can concentrate on management of the Stormwater Program.

They could keep a full time officer busy with complaints, code enforcement, and inspections and recommend an inspection by their department of the stormwater devices that they regulate… recommend a stormwater management inspection as a part of the ZCP process.

Need to be cleaned out more times per year.

This has been embarrassing. Know very little about this important topic. Do think it is important.

Am aware that the Town has a very capable and concerned staff in stormwater management.

Think that larger stormwater devices that handle runoff from multiple lots would work better in the long run than the small lot by lot devices.

Keep up good work for future!

Suggest that the Stormwater Management Division allocate funds to hire "Stream Troopers" who would walk all perennial streams in Chapel Hill to collect information on the physical stream environment as necessary to compile a comprehensive written/GIS/digital photo record and inventory of stream conditions throughout the Chapel Hill planning jurisdiction. These troopers could be hired on a contract basis and/or could utilize University students as paid interns. The inventory data could best be collected during the winter months when vegetative cover is at a minimum thus allowing easier access and mobility along stream reaches and better visibility for inspecting/photographing stream bank and bed conditions.

It seems to be evolving – need additional staff.

There are regulations in the LUMO requiring property owners to provide structural controls for more than 5,000 sq. ft. of land disturbance (any new home). Is this providing the benefits it is assumed are the result of such controls? Does this need to be studied in the context of the Stormwater Management Program.

We have generally minor flooding in the same places whenever we get a heavy rain. Don't know if anything can be done about it, but it would seem to fall under Stormwater Management.

All involved parties (management and staff) taking a comprehensive approach – competent staff in all related service departments – higher priority needs to be given to funding outstanding maintenance and improvement projects.

Areas prone to flooding should be addressed.

Would like to see fee structure sufficient to cover all related costs (eliminating need for subsidies by general fund). Creation of cost accounting financial system, incorporating use of work orders.

The stormwater management program is very effective. The nature of development and land use in our community will always present challenges for this program.

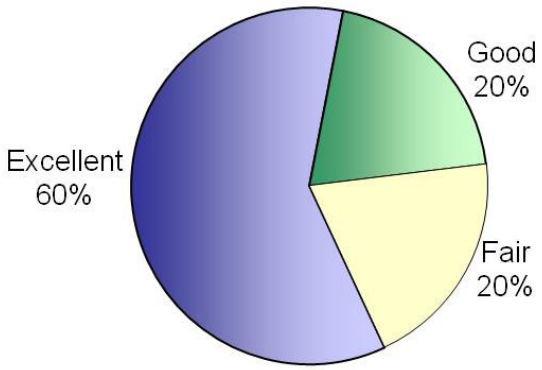
Appendix 5f – Town Advisory Boards & Commissions Survey Results

(5 Town Advisory Board/Commission Chair survey participants)

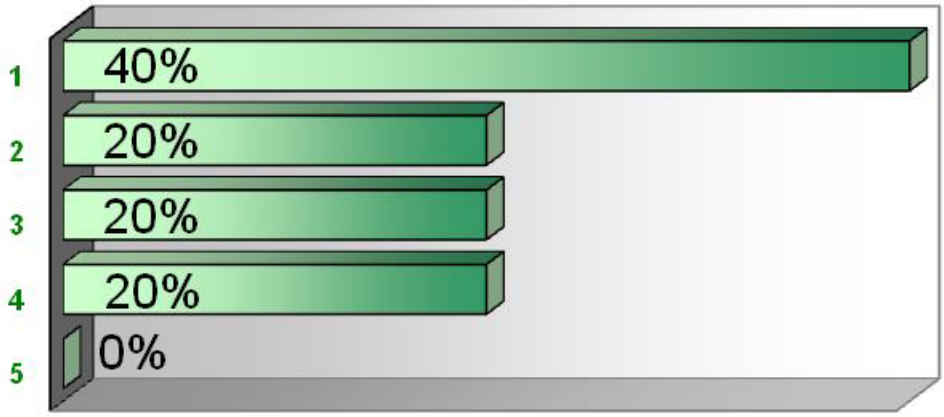
1. **Which Town of Chapel Hill Advisory Board/Commission do you represent?**

   > Greenways Commission
   > Human Services Advisory Board
   > Bicycle and Pedestrian Advisory Board
   > Community Design Commission
   > Transportation Board

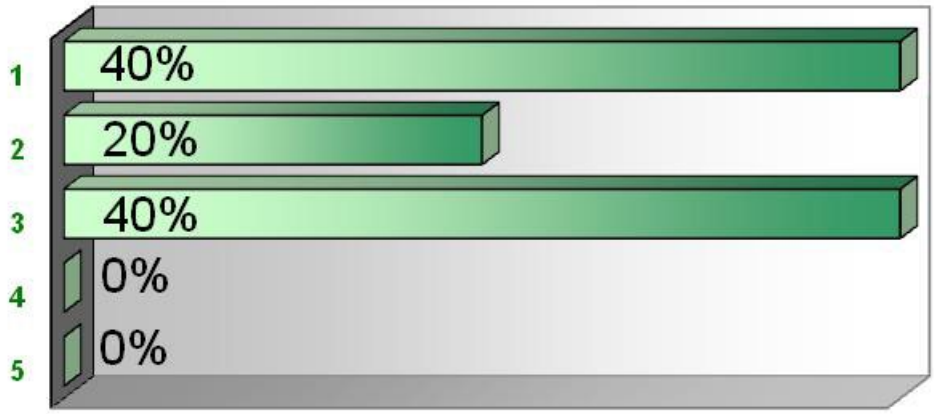
2. **How would you rate the overall quality of living and working in Chapel Hill?**



3. **How important is the natural environment as an element of your Advisory Board/Commission organizational goals?** *(On a scale from 1 to 5, where 1=Very Important and 5= Not Important.)*



4. How aware were you of the Town of Chapel Hill's Stormwater Management Program before you received this survey? *(On a scale from 1 to 5, where 1=Very Aware and 5=Knew Nothing.)*



5. If aware, how did you learn about it?

Town mailings; info emails

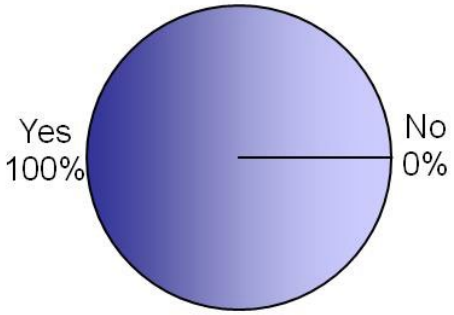
Drainage problems with adjoining properties: I called for advice from one of SMP's engineers

I was aware of it only because I'm also a student in City & Regional Planning at UNC – not through my role on the (Town) Board or as a citizen.

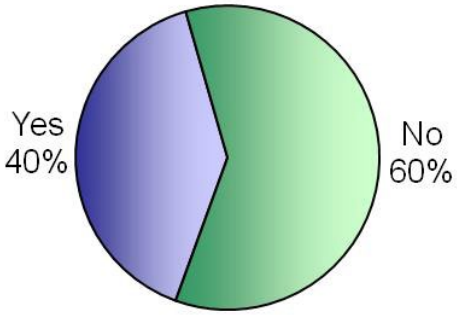
Working through Applications for development.

Newspaper/Town articles and discussion at Town Council Meetings.

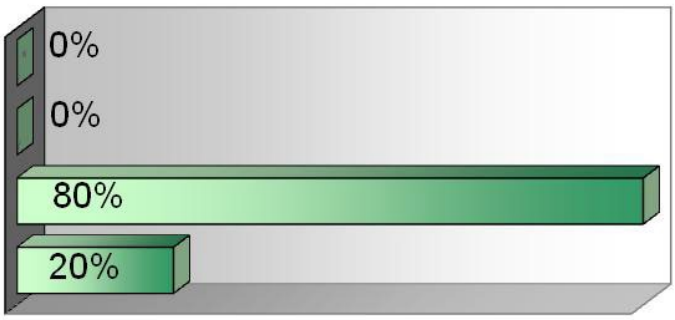
6. Are you aware that property owners in Chapel Hill pay a stormwater fee to fund stormwater programs and services provided by the Town?



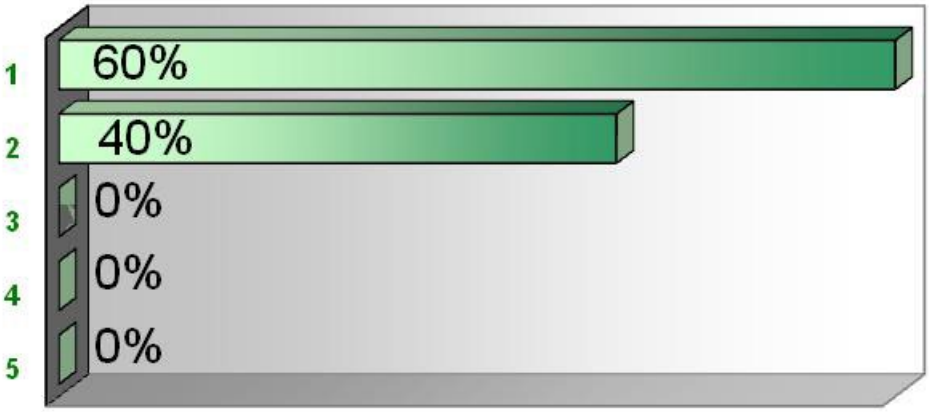
7. Have you used Chapel Hill's Internet Website (www.townofchapelhill.org/stormwater) for access to water quality, drainage, flooding, or other stormwater-related information?



8. Where does stormwater in Chapel Hill go after it enters storm drains?



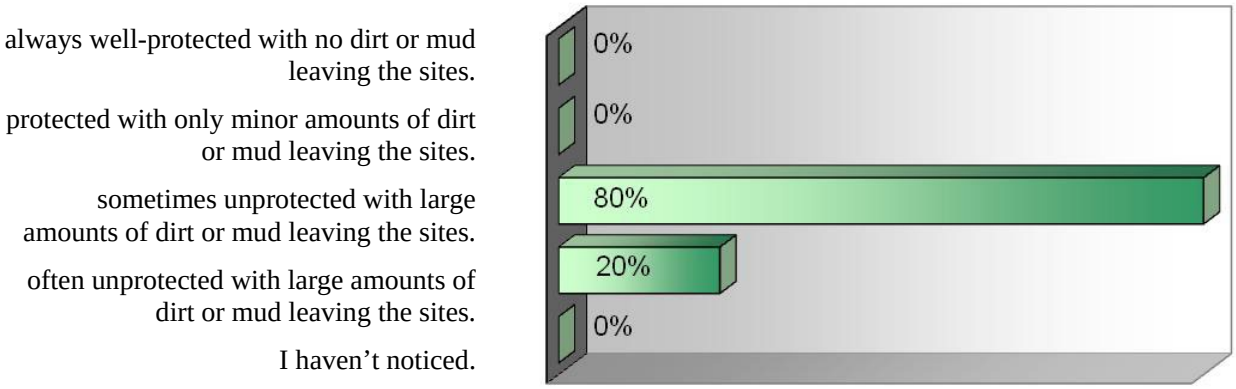
9. Do you agree or disagree that the Town has a responsibility to provide stormwater programs and services to reduce the amount of pollution entering local creeks and lakes?
(On a scale from 1 to 5, where 1=Strongly Agree and 5= Strongly Disagree.)



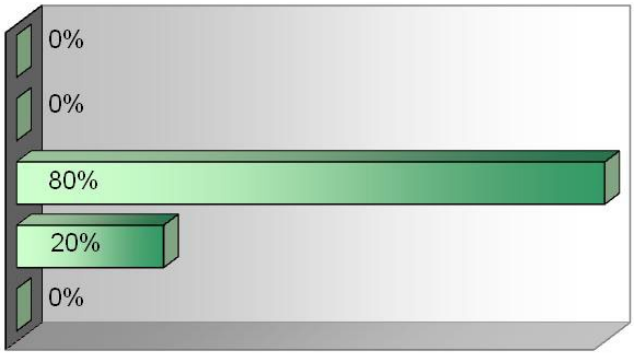
10. How do you perceive the significance of each of the following sources of water pollution as <u>those responsible for pollution in Chapel Hill's creeks and lakes</u>?

Sources of Water Pollution	Very Significant	Significant	Not Significant	Don't Know
Sewage treatment plants		20%	80%	
Air pollutants (e.g., acid rain or exhaust)		60%	40%	
Runoff from parking areas and streets	60%	20%	20%	
Runoff from farms	20%	60%	20%	
Runoff from forested or undeveloped land			100%	
Runoff from residential development	60%	40%		
Runoff from commercial development	60%	40%		
Runoff from construction sites	100%			
Stream bank erosion	20%	60%		20%
Oil, grease, chemicals, trash, and other wastes dumped in roads, parking lots, storm drains or ditches	40%	40%		20%
Fuel or chemical spills and leaks	40%	20%	20%	20%
Leaks from septic systems	40%		40%	20%
Leaks or spills from sanitary sewer systems		60%	20%	20%
Improperly applied fertilizers and pesticides	20%	80%		

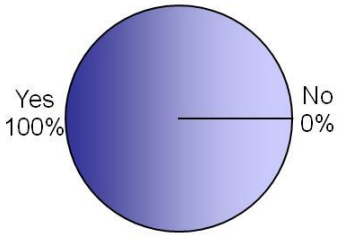
11. Construction sites you have seen or worked with in Chapel Hill are _____?



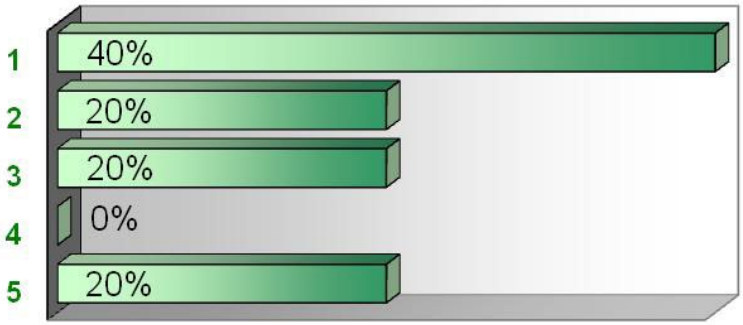
12. From your observations, how well do storm drains, drainage culverts under roadways, drainage ditches and channels generally function within Chapel Hill? They…



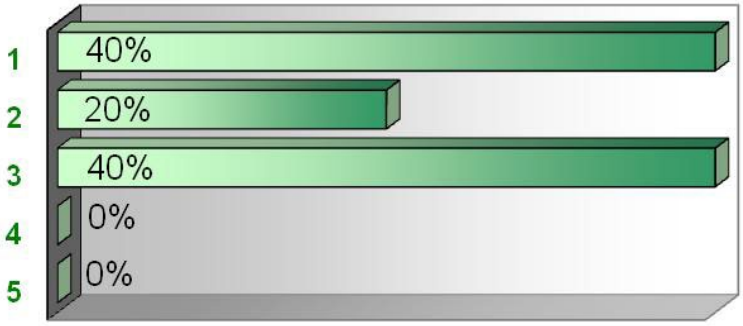
13. Are you aware of any drainage or flooding problems within Chapel Hill?



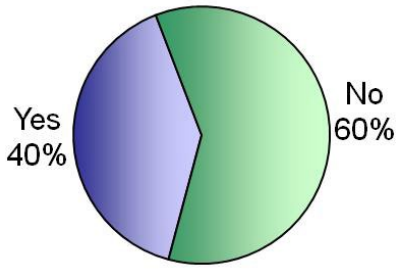
14. Do you agree or disagree that the Town should provide funding, as well as technical help, to reduce drainage and flooding problems on private property? *(On a scale from 1 to 5, where 1=Strongly Agree and 5= Strongly Disagree.)*



15. Do you agree or disagree that unmowed vegetation should be kept along the edges of creeks and lakes? *(On a scale from 1 to 5, where 1=Strongly Agree and 5= Strongly Disagree.)*



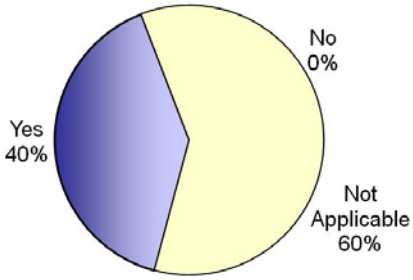
16. Have you or other members of your Advisory Board/Commission had interactions within the past two years with the Town's Stormwater Management Program and/or the Stormwater Management Advisory Board?



17. If YES to #16, please describe the nature and extent of interaction(s).

Applicants dealing with Stormwater Management in various manners by Civil Engineers presenting.

18. If YES to #16, were you satisfied with the interaction(s) and response(s) you received?



19. If NO to #18, please explain.

The Transportation Board does not consider Stormwater issues directly when deciding matters that come before it.

As the (representative) of (a local) Homeowners Association, I am very disappointed that our Town's Stormwater Management Program officials did not respond to our WRITTEN request for fee exemption. It has been almost two years since we sent our request and to date we have not been notified of any action taken by the program.

Questions #20 and #21 are based on the following Council-approved mission and priorities of the Town of Chapel Hill Stormwater Management Program:

Town of Chapel Hill Stormwater Program Mission

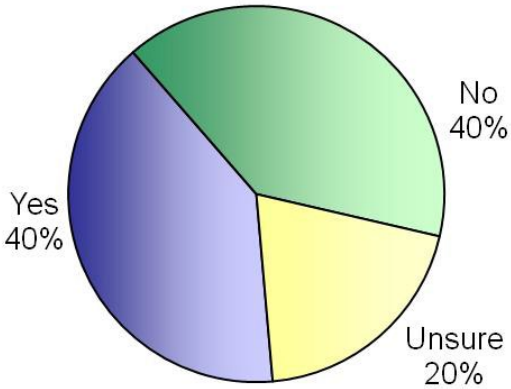
It is the Mission of the comprehensive Stormwater Management Program to:

- protect the health and safety of both the public and the ecosystem,
- address both stormwater quality and stormwater quantity concerns, and
- meet or exceed federal and state mandates regarding stormwater.

Stormwater Program Priorities

1. Develop and implement a comprehensive Stormwater Program Master Plan that supports all of the stormwater program priorities.
2. Address stormwater quantity (flooding) as an integral component within the program.
3. Address stormwater quality as an integral function within the program.
4. Protect and restore natural stream corridors.
5. Develop a formal public education and involvement program.
6. Define the level of service and performance standards for the Town's Stormwater Program.
7. Ensure compliance with federal and state regulatory mandates.
8. Establish clear stormwater program leadership that the public recognizes.
9. Integrate programs to utilize resources efficiently.
10. Establish an understanding of the stormwater system as a "utility."

20. Do the Town's Stormwater Management Program goals, priorities and activities (outlined above) have a relationship or bearing upon the goals, priorities, and activities of your Advisory Board/Commission?



21. If YES to #20, please specify ways in which the Town's Stormwater Management Program and/or Stormwater Management Advisory Board can best support and help advance the goals of your Advisory Board/Commission and vice-versa.

The Greenways Commission's goal is to acquire and maintain open space for the benefit of the environment as well as to provide citizens access to natural areas. Often our "improved" trails and natural trails route through stream corridors where negative Stormwater impacts (pollution, erosion of resources, erosion of eco systems,…) may be observed. Promotion of greenways and open spaces mutually benefits the goals of the Stormwater Program because both help citizens understand what environmental efforts tangibly mean.

Offer a workshop program to our board for educational purposes – 2 hours at time other than our monthly meetings.

22. Please share any comments, suggestions, questions, or observations on behalf of your Advisory Board/Commission regarding the Town of Chapel Hill Stormwater Management Program and/or Stormwater Management Advisory Board.

Along our trails simple signage or public art could be used to educate the public about the links between stream corridors and storm drainage system – the story of how water flows through an open space can reveal interesting things about behaviors and practices outside the natural area as well as within it – a story of positive and negative factors, one that educates and helps our citizens appreciate the beauty we have and work towards a sustainable future.

My experience and awareness of stormwater management are as a property owner. They are not related to the issues addressed by the Human Services Advisory Board.

Would like to discuss/investigate ways to reconcile street runoff reduction strategies (such as forgoing curbs and gutters) with construction of sidewalks and bike lanes. Very much in favor of reducing street runoff by allowing sheet flow, but don't know how to accommodate both sheet flow and sidewalks. Would like to see examples of best practices from other towns that might have worked through this problem already.

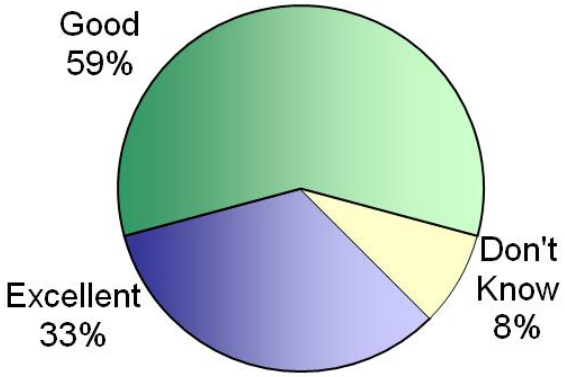
Would like to know more and plan to use the website.

Appendix 5g – External Stakeholders Survey Results

(12 external stakeholder organization survey participants)

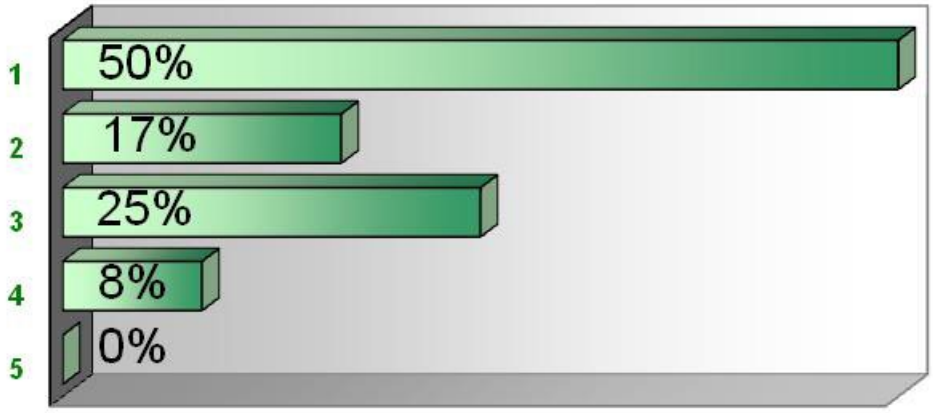
Town of Carrboro, Home Builders Association, Orange County Erosion & Sediment Control, Chapel Hill Downtown Partnership, Triangle J Council of Governments (TJCOG), NC Division of Water Quality/Stormwater Unit, City of Durham Storm Water Services, Orange County Environmental Health Department, Orange Community Housing and Land Trust, Morgan Creek Valley Alliance, Durham City/County Planning, and Orange Soil and Water Conservation District, respectively

1. **How would you rate the overall quality of living and working in [Chapel Hill/the Triangle region]?**



2. **How important is the natural environment as an element of your work or organizational goals?** *(On a scale from 1 to 5, where 1=Very Important and 5= Not Important.)*

3. **How aware were you of the Town of Chapel Hill's Stormwater Management Program before you received this survey?** *(On a scale from 1 to 5, where 1= Very Aware and 5= Knew Nothing.)*



4. **If aware, how did you learn about it?**

I am a local government employee in environmental matters.

Reports from members concerning interaction, participation in meetings related to the issue and related to Jordan Lake.

I have been following the NPDES Phase II permit requirements for 10 years and was involved early on in discussions with the County, Chapel Hill and Carrboro as to recommending a collaborative, regional approach or have each regulated entity act on their own.

Town Council Meeting

Chapel Hill is a member of the Clean Water Education Partnership (CWEP), managed by TJCOG. Wendy Smith (Chapel Hill Stormwater) represents Chapel Hill on the CWEP steering committee. Trish D'Arconte (Chapel Hill Stormwater) represents Chapel Hill in non-point source issues related to Jordan Lake nutrient management, and TJCOG has been involved with Jordan Lake nutrient management since developing the nutrient response model.

Application review DWQ Permitting Unit

Prior conversations with Wendy Smith (Chapel Hill Stormwater).

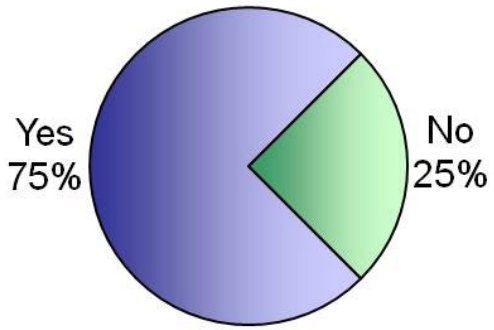
OCHLT has developed several properties in the Chapel Hill Planning jurisdiction during the last several years since the LUMO was enacted.

I have learned about the Program by having an interest in local watershed issues.

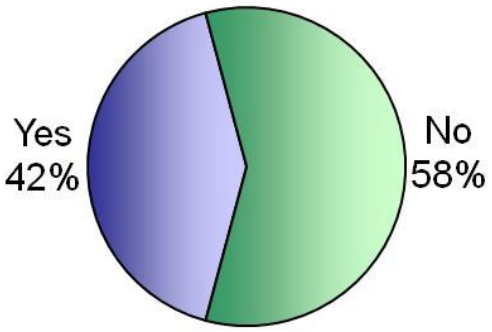
As a regulator, I am aware of it, but know few details.

I have worked with Wendy Smith (Chapel Hill Stormwater) on potential Stormwater BMP's on urban sites. Also, local Soil and Water Conservation District is actively involved in the Soil and Water "Community Conservation" program that has been passed by the legislative committees. This program will target urban erosion/runoff problems and hopefully have funding for BMP's in the near future.

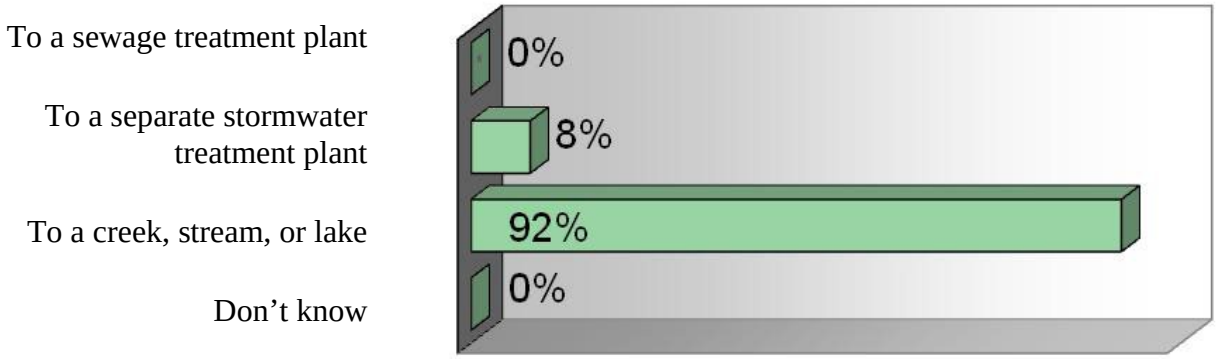
5. **Are you aware that property owners in Chapel Hill pay a stormwater fee to fund stormwater programs and services provided by the Town?**



6. **Have you used Chapel Hill's Internet Website (www.townofchapelhill.org/stormwater) for access to water quality, drainage, flooding, or other stormwater-related information?**



7. **Where does stormwater in [Chapel Hill/the Triangle region] go after it enters storm drains?**

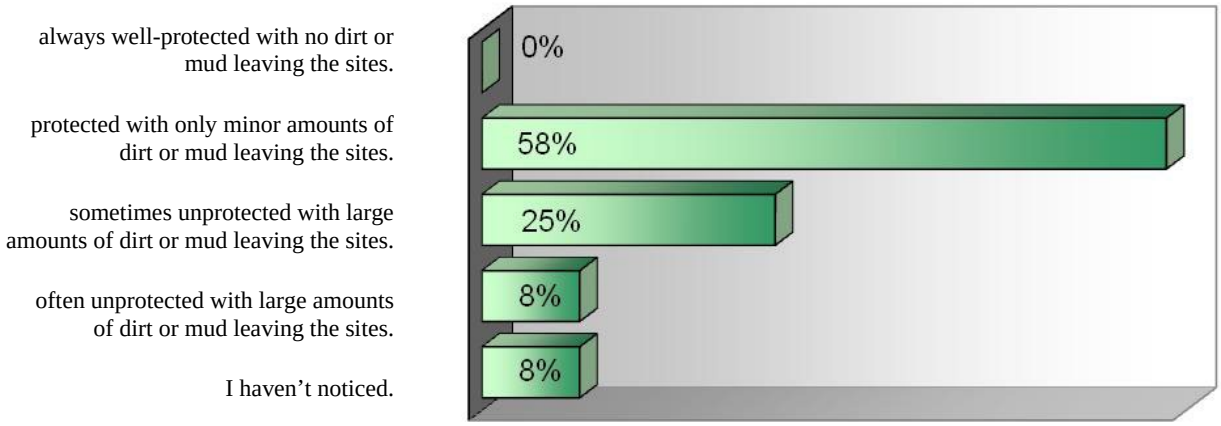


8. **Do you agree or disagree that local governments have a responsibility to provide stormwater programs and services to reduce the amount of pollution entering local creeks and lakes?** *(On a scale from 1 to 5, where 1=Strongly Agree and 5= Strongly Disagree*. 8% of survey participants did not respond.)

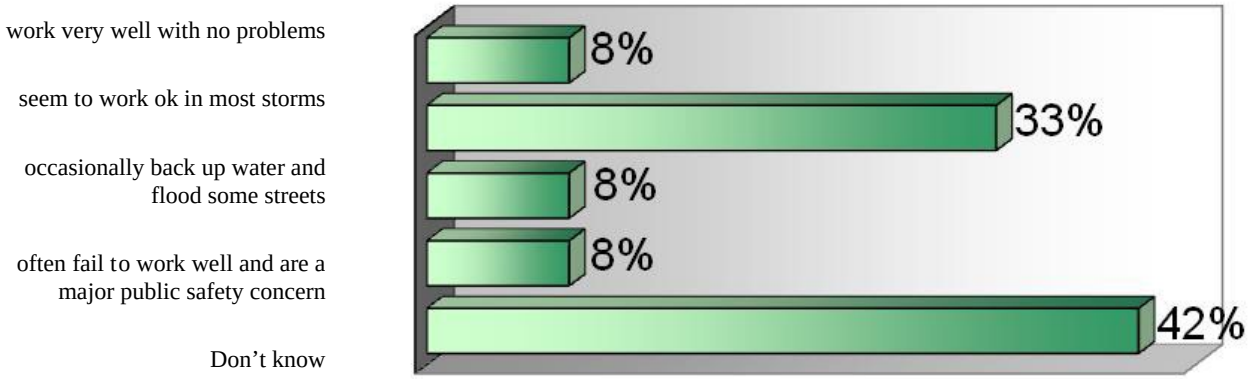
9. How do you perceive the significance of each of the following sources of water pollution as <u>those responsible for pollution in [Chapel Hill's/the Triangle region's] creeks and lakes</u>?

Sources of Water Pollution	Very Significant	Significant	Not Significant	Don't Know
Sewage treatment plants	25%	33%	42%	
Air pollutants (e.g., acid rain or exhaust)	33%	42%	25%	
Runoff from parking areas and streets	58%	42%		
Runoff from farms	42%	42%	16%	
Runoff from forested or undeveloped land		25%	75%	
Runoff from residential development	33%	58%	9%	
Runoff from commercial development	33%	67%		
Runoff from construction sites	50%	50%		
Stream bank erosion	25%	33%	33%	9%
Oil, grease, chemicals, trash, and other wastes dumped in roads, parking lots, storm drains or ditches	50%	42%	8%	
Fuel or chemical spills and leaks	33%	33%	33%	
Leaks from septic systems	42%	16%	42%	
Leaks or spills from sanitary sewer systems	42%	25%	33%	
Improperly applied fertilizers and pesticides	50%	50%		

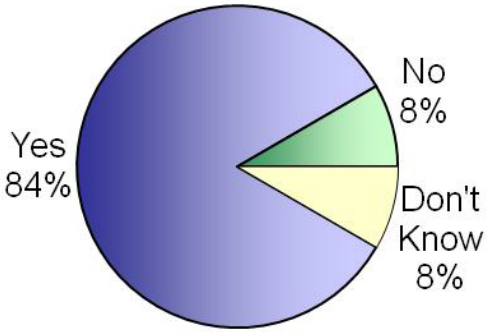
10. Construction sites you have seen or worked with in [Chapel Hill/the Triangle region] are ____?



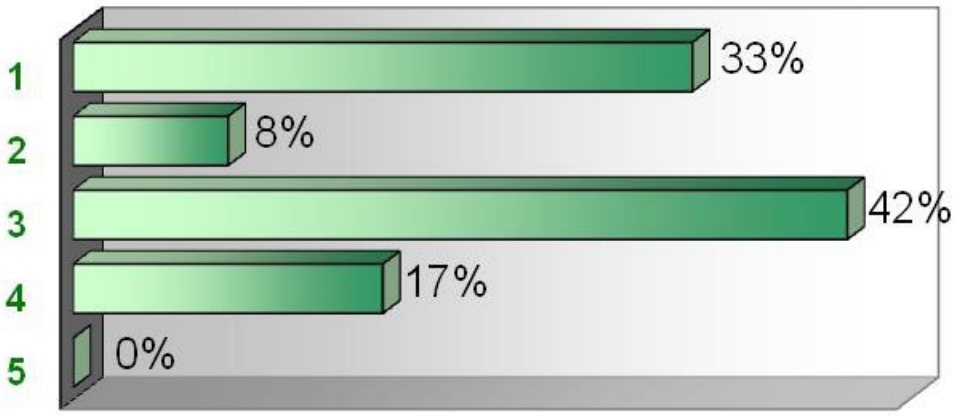
11. From your observations, how well do storm drains, drainage culverts under roadways, drainage ditches and channels generally function <u>within Chapel Hill</u>? They…



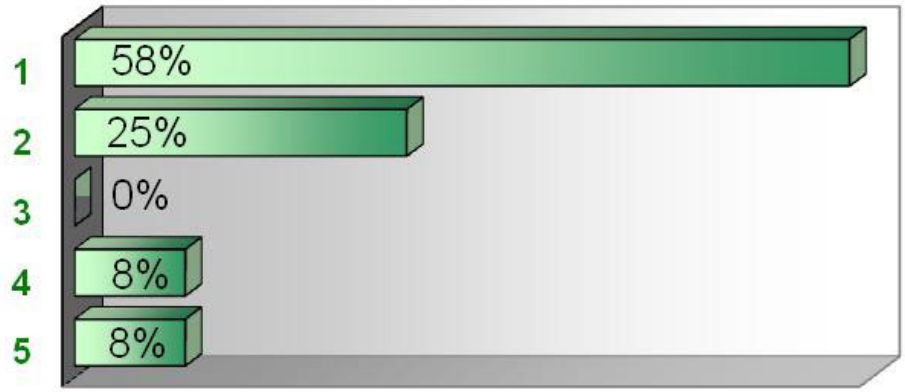
12. Are you aware of any drainage or flooding problems <u>within Chapel Hill</u>?



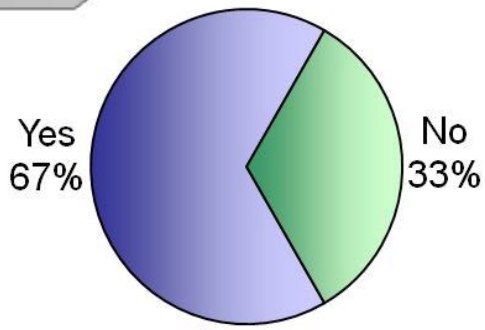
13. Do you agree or disagree that local governments should provide funding, as well as technical help, to reduce drainage and flooding problems on <u>private property</u>? *(On a scale from 1 to 5, where 1=Strongly Agree and 5= Strongly Disagree.)*



14. Do you agree or disagree that unmowed vegetation should be kept along the edges of creeks and lakes? *(On a scale from 1 to 5, where 1=Strongly Agree and 5= Strongly Disagree.)*



15. Has your organization had interactions within the past two years with the <u>Town of Chapel Hill's Stormwater Management Program</u>?



16. If yes to #15, please describe the nature and extent of interaction(s).

Town of Carrboro works closely with Chapel Hill

Extensive. Erosion (and sediment) control is closely tied to Stormwater. We have somewhat overlapping responsibilities. County personnel work closely with Town Staff.

Staff from the Town of Chapel Hill's Stormwater Management Program participates in the Clean Water Education Partnership (CWEP), the Jordan Lake Nutrient Trading Study, the Jordan Lake Nutrient Rules stakeholder process, and the TJCOG Water Resources Advisory Committee, all of which are either managed or supported by the TJCOG.

Application review DWQ SW Permitting Unit, SW Implementation Groups and Stakeholder meetings.

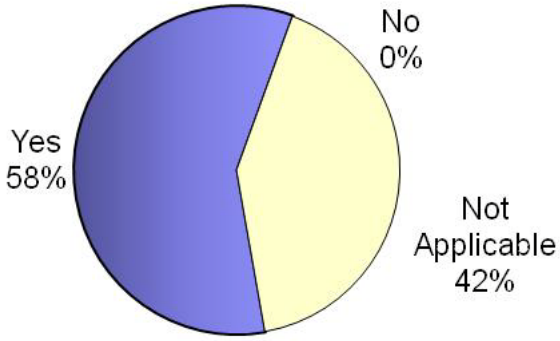
Worked with Wendy Smith (Chapel Hill Stormwater) on reports of dumping grease, wastewater, and parking lot runoff at (a local) restaurant. Have (also) responded to reports of dumping grease at (another location).

The (Town) Stormwater Management staff reviews ZCP applications that contain our proposed Stormwater Management Plan.

Both the North Carolina Botanical Garden and its associated Morgan Creek Valley Alliance have attended Town of Chapel Hill meetings that have been represented when there were projects associated with local streams. We have also reported sediment control infractions.

Wendy Smith (Chapel Hill Stormwater) and I have discussed several potential programs and BMP work on school sites such as East Chapel Hill High School. Ms. Smith assisted me with information on a 319 Clean Water Grant proposal that I was writing to secure money to fund the BMP's needed to prevent the soil erosion on the school site. She and I have also talked about other programs that can be coordinated through our agencies.

18. If you had interaction with the Chapel Hill Stormwater Management Program, were you satisfied with the response you received?



19. If you were <u>not satisfied</u> with your organization's interaction(s) with Chapel Hill's Stormwater Management Program, please explain.

58% of survey participants responded: ***Not applicable***

Questions #19 and #20 are based on the following mission and priorities of the Town of Chapel Hill Stormwater Management Program:

Town of Chapel Hill Stormwater Program Mission

It is the Mission of the comprehensive Stormwater Management Program to:

- protect the health and safety of both the public and the ecosystem,
- address both stormwater quality and stormwater quantity concerns, and
- meet or exceed federal and state mandates regarding stormwater.

Stormwater Program Priorities

1. Develop and implement a comprehensive Stormwater Program Master Plan that supports all of the stormwater program priorities.
2. Address stormwater quantity (flooding) as an integral component within the program.
3. Address stormwater quality as an integral function within the program.
4. Protect and restore natural stream corridors.
5. Develop a formal public education and involvement program.
6. Define the level of service and performance standards for the Town's Stormwater Program.
7. Ensure compliance with federal and state regulatory mandates.
8. Establish clear stormwater program leadership that the public recognizes.
9. Integrate programs to utilize resources efficiently.
10. Establish an understanding of the stormwater system as a "utility."

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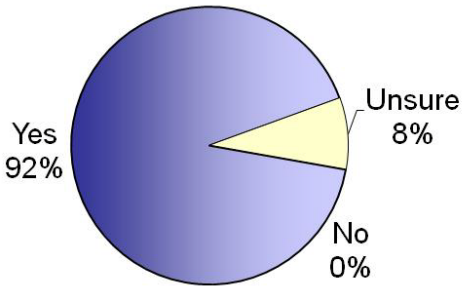
19. Do the Chapel Hill Stormwater Management Program goals, priorities and activities (outlined above) have a relationship or bearing upon the goals, priorities, and activities of your organization?



20. If yes to #19, please specify ways in which the Chapel Hill Stormwater Management Program can best support and help advance the goals of your organization and vice-versa.

Keep doing what they are doing.

Clearly, our members have significant interest in the most economical, in terms of money expended and actual benefit derived (as opposed to rules for rules' sake), provision of an approach to these priorities.

We need to have the best information we can get about the real effect of measures that are taken and the most flexible, results oriented approach to enforcement (as opposed to letter of the law bureaucracy) that can be achieved.

Actually, we support them.

Stormwater issues downtown will increase as construction increases, therefore early education is pertinent.

Our organizations can best help each other by keeping each other informed of ongoing and new projects and programs, sharing data and information, responding to requests for assistance or involvement in a timely manner, and being receptive to opportunities for new partnerships.

Compliance with (regulatory) permit requirements.

Continued coordination of complaint responses. Coordinating issues that may have to do with restaurant operations or septic systems.

Expedite the review of Stormwater Management plans that would improve the turn-around of ZCP applications.

Both the North Carolina Botanical Garden and Morgan Creek Valley Alliance work to educate the public about water quality and watershed protection issues, many of which go beyond the more obvious issues of point and non-point pollution from sediment and chemicals to the general conservation of biological diversity.

Stormwater does not respect political boundaries. Solutions to problems will be multi-jurisdictional.

Our Community Conservation program will place emphasis on the protection and restoration of stream corridors, reduce sediment flow into stream, develop and enhance public educational programs, and assist landowners with BMP's to control Stormwater. The Soil and Water Conservation District would like to work with Chapel Hill Stormwater Management Program to coordinate activities that will help reach goals and the Stormwater priorities.

21. Please share any comments, suggestions, questions, or observations from your organization regarding the Town of Chapel Hill Stormwater Management Program.

I enjoy working with the Town of Chapel Hill's Stormwater Management Program staff whenever I have the opportunity. They are competent, professional, and fun to be with.

I think that most individuals are less aware of the Program as they might otherwise be. Perhaps there is some way to provide educational materials to neighborhood associations, the local schools, UNC students and their student organizations, and even churches.

Appendix 5h – Baseline Community Resident Survey Results

(Results provided by Town of Chapel Hill and SurveyMethods.com)

3,000 surveys sent out to a random sample of Chapel Hill residences.

785 complete surveys received and 8 partially completed surveys received for a total of 793 survey participants.

Survey Methods

Ask, Analyze, Improve
Survey Creation, Deployment, & Analysis Tools for Businesses

Analyze Survey Results - Results Summary

Survey: Town of Chapel Hill Stormwater Services Survey

The data below represents this survey's consolidated results. To conduct analysis on what types of individuals answered questions in a particular way, click on the Create Criteria button.

Survey Status

Status:	Closed
Deploy Date:	10/24/2006
Closed Date:	11/27/2006

Respondent Statistics

Total Responses:	793
Completes:	785
Partials:	8

Points Summary:

No Points Questions used in this survey.

Convert to PDF

Email PDF

Create Display Criteria

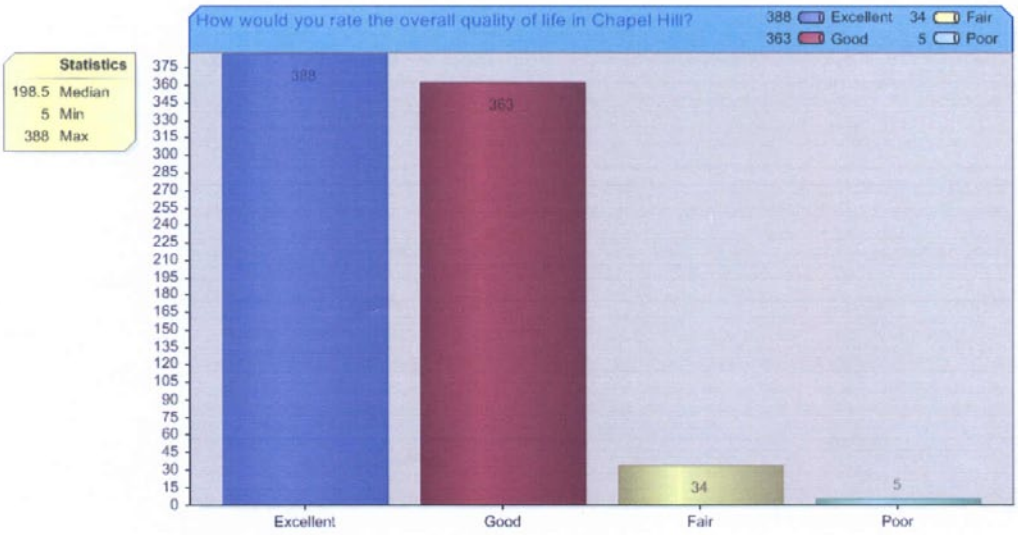
Criteria Active: 0 Create Criteria

View Questions: 1 to 5

Summarized Data Report - Survey: Town of Chapel Hill Stormwater Services Survey

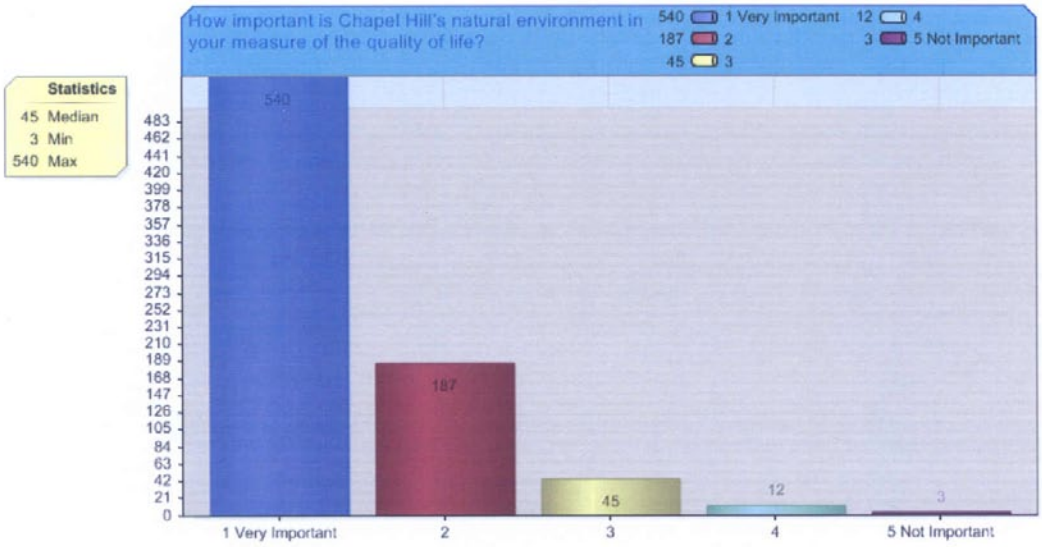
1. How would you rate the overall quality of life in Chapel Hill?

	Responses	Percent
Excellent:	388	49.11%
Good:	363	45.95%
Fair:	34	4.3%
Poor:	5	0.63%
Total Responded to this question:	790	99.62%
Total who skipped this question:	3	0.38%
Total:	793	100%



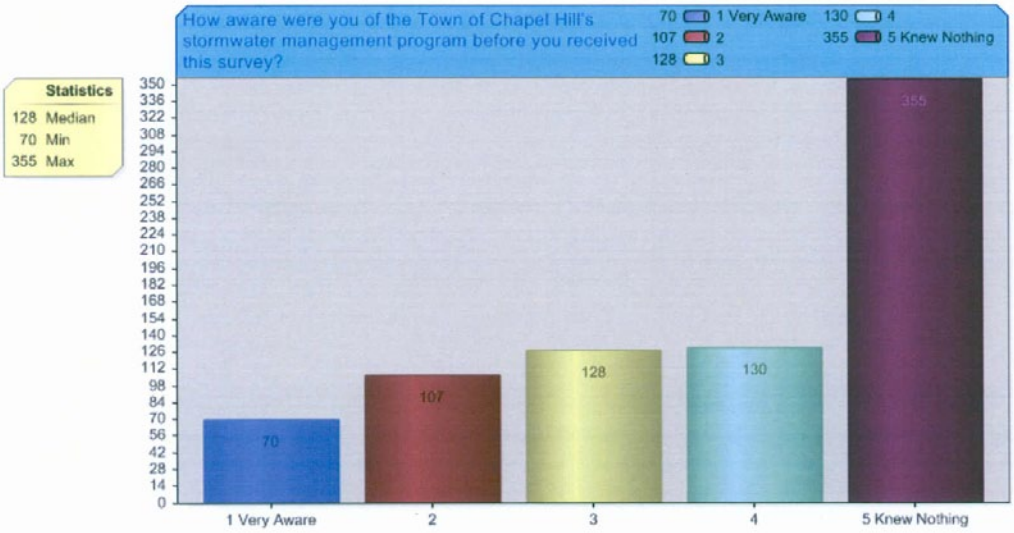
2. How important is Chapel Hill's natural environment in your measure of the quality of life?

	Responses	Percent
1 Very Important:	540	68.61%
2:	187	23.76%
3:	45	5.72%
4:	12	1.52%
5 Not Important:	3	0.38%
Total Responded to this question:	787	99.24%
Total who skipped this question:	6	0.76%
Total:	793	100%



3. How aware were you of the Town of Chapel Hill's stormwater management program before you received this survey?

	Responses	Percent
1 Very Aware:	70	8.86%
2:	107	13.54%
3:	128	16.2%
4:	130	16.46%
5 Knew Nothing:	355	44.94%
Total Responded to this question:	790	99.62%
Total who skipped this question:	3	0.38%
Total:	793	100%



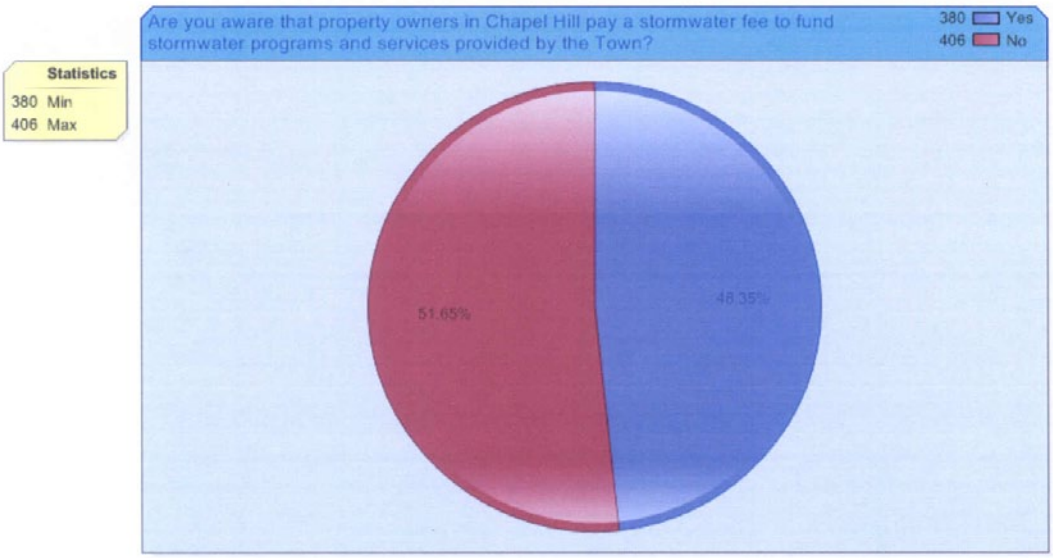
4. If aware, how did you learn about it?

	Responses	Percent
Responses:	314	100%
Total Responded to this question:	314	39.6%
Total who skipped this question:	479	60.4%
Total:	793	100%

Graph/Chart function not relevant for this question type.

5. Are you aware that property owners in Chapel Hill pay a stormwater fee to fund stormwater programs and services provided by the Town?

	Responses	Percent
Yes:	380	48.35%
No:	406	51.65%
Total Responded to this question:	786	99.12%
Total who skipped this question:	7	0.88%
Total:	793	100%



Survey Methods

Ask, Analyze, Improve
Survey Creation, Deployment, & Analysis Tools for Businesses

Analyze Survey Results - Results Summary

Survey: Town of Chapel Hill Stormwater Services Survey

The data below represents this survey's consolidated results. To conduct analysis on what types of individuals answered questions in a particular way, click on the Create Criteria button.

Survey Status		Respondent Statistics		Points Summary:
Status:	Closed	**Total Responses:**	793	No Points Questions used in this survey.
Deploy Date:	10/24/2006	**Completes:**	785	
Closed Date:	11/27/2006	**Partials:**	8	

Convert to PDF

Email PDF

Create Display Criteria

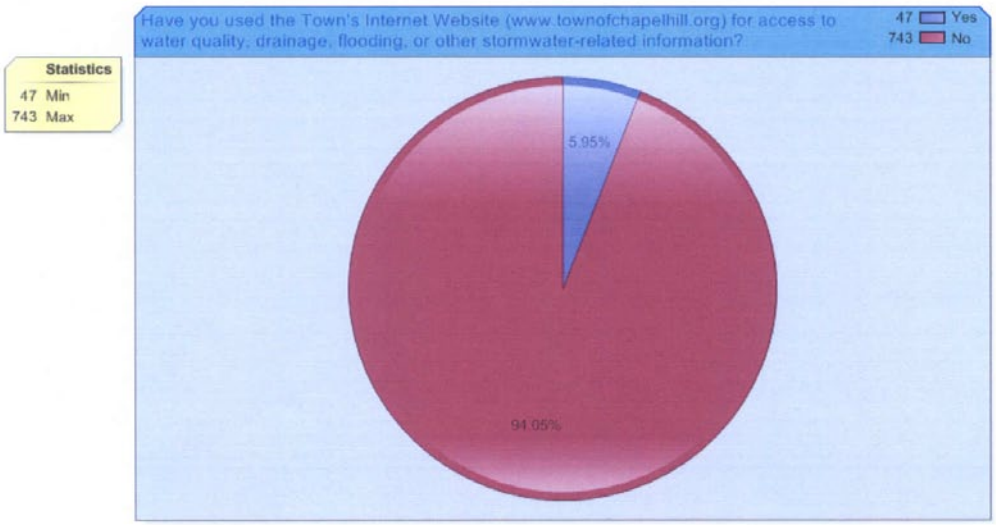
Criteria Active: 0 Create Criteria

View Questions: 6 to 10

Summarized Data Report - Survey: Town of Chapel Hill Stormwater Services Survey

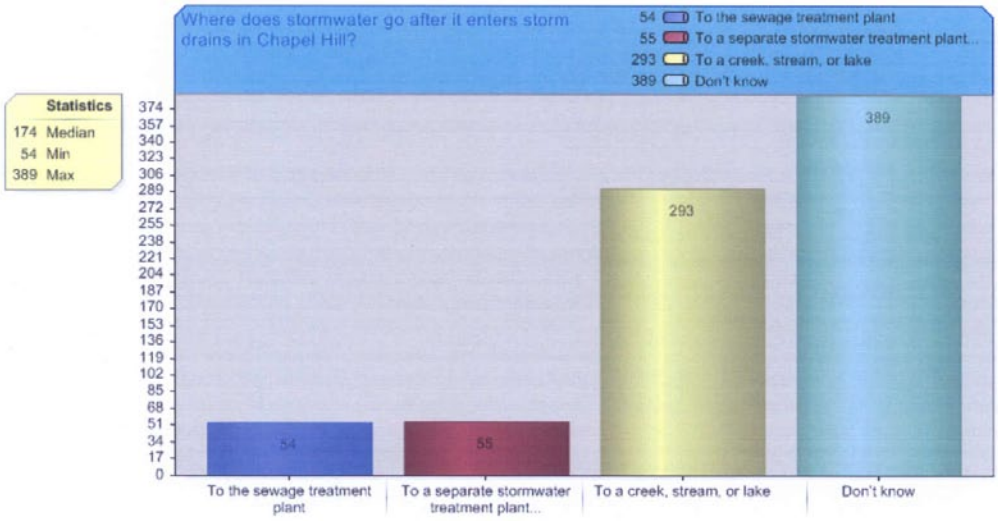
6. Have you used the Town's Internet Website (www.townofchapelhill.org) for access to water quality, drainage, flooding, or other stormwater-related information?

	Responses	Percent
Yes:	47	5.95%
No:	743	94.05%
Total Responded to this question:	790	99.62%
Total who skipped this question:	3	0.38%
Total:	793	100%



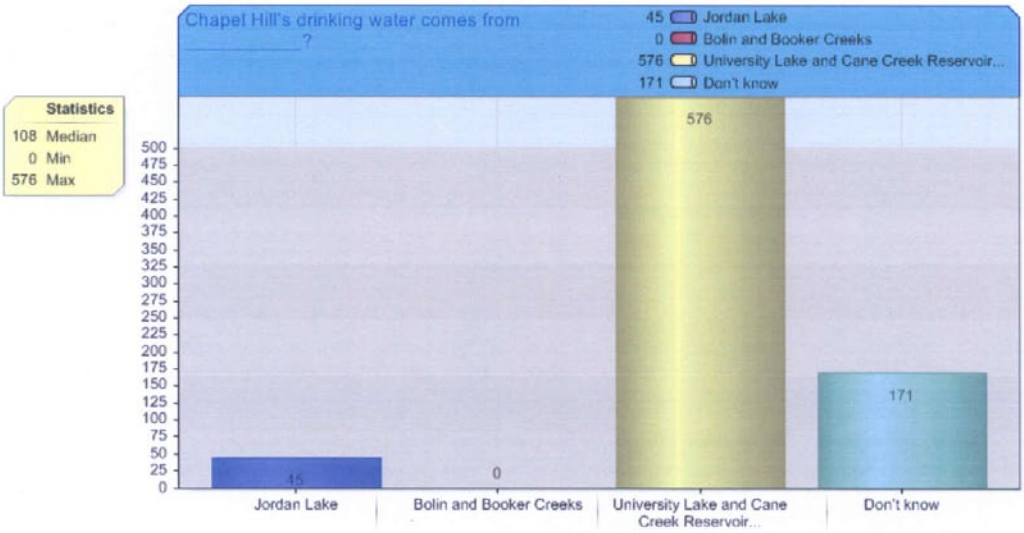
7. Where does stormwater go after it enters storm drains in Chapel Hill?

	Responses	Percent
To the sewage treatment plant:	54	6.83%
To a separate stormwater treatment plant:	55	6.95%
To a creek, stream, or lake:	293	37.04%
Don't know:	389	49.18%
Total Responded to this question:	791	99.75%
Total who skipped this question:	2	0.25%
Total:	793	100%



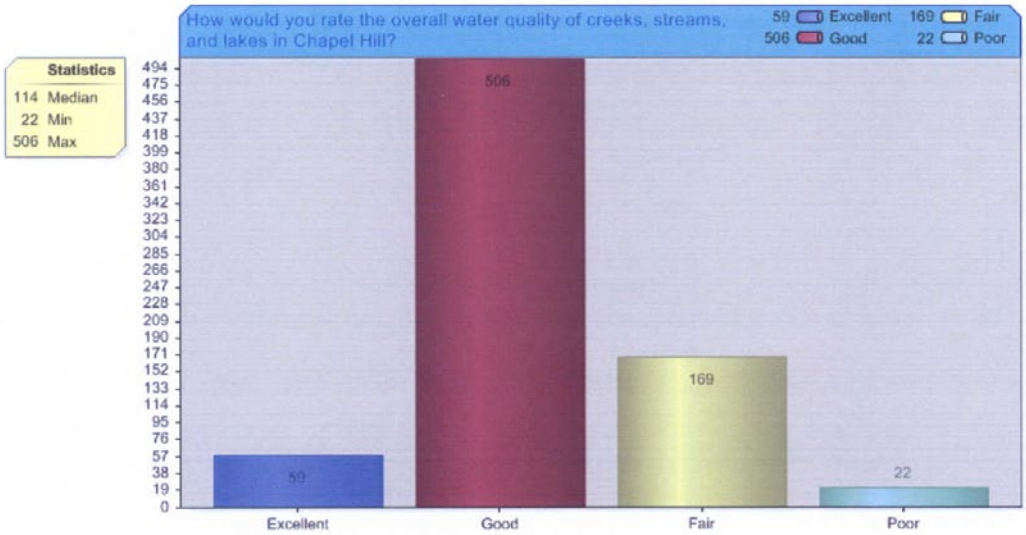
8. Chapel Hill's drinking water comes from _____?

	Responses	Percent
Jordan Lake:	45	5.68%
Bolin and Booker Creeks:	0	0%
University Lake and Cane Creek Reservoir:	576	72.73%
Don't know:	171	21.59%
Total Responded to this question:	792	99.87%
Total who skipped this question:	1	0.13%
Total:	793	100%



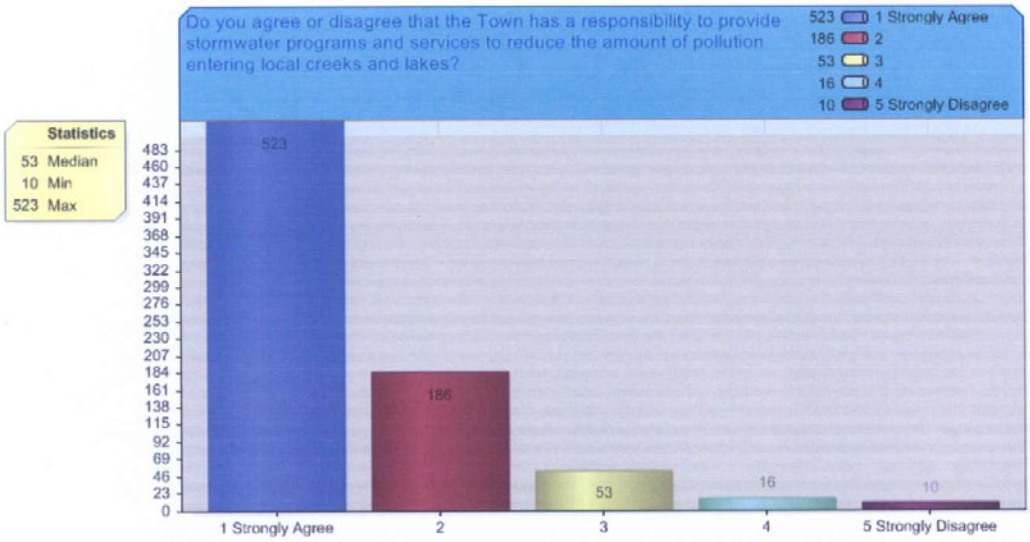
9. How would you rate the overall water quality of creeks, streams, and lakes in Chapel Hill?

	Responses	Percent
Excellent:	59	7.8%
Good:	506	66.93%
Fair:	169	22.35%
Poor:	22	2.91%
Total Responded to this question:	756	95.33%
Total who skipped this question:	37	4.67%
Total:	793	100%



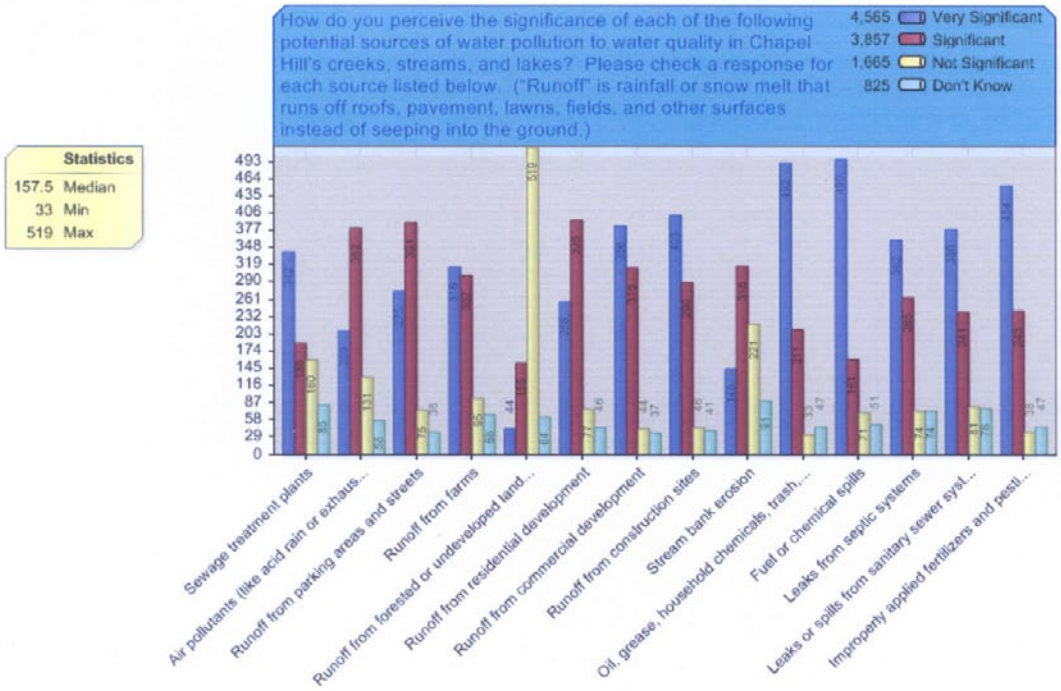
10. Do you agree or disagree that the Town has a responsibility to provide stormwater programs and services to reduce the amount of pollution entering local creeks and lakes?

	Responses	Percent
1 Strongly Agree:	523	66.37%
2:	186	23.6%
3:	53	6.73%
4:	16	2.03%
5 Strongly Disagree:	10	1.27%
Total Responded to this question:	788	99.37%
Total who skipped this question:	5	0.63%
Total:	793	100%



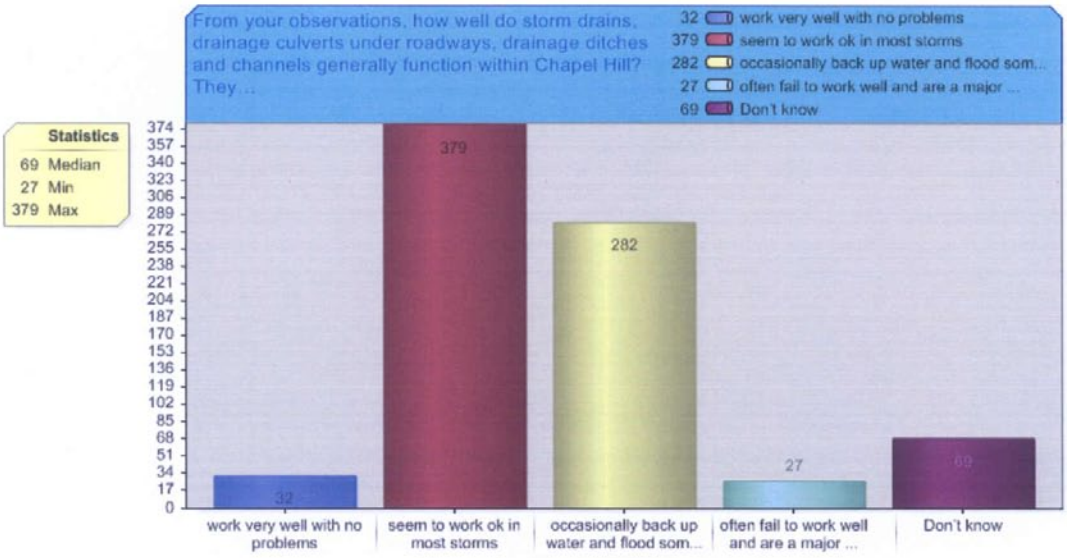
11. How do you perceive the significance of each of the following potential sources of water pollution to water quality in Chapel Hill's creeks, streams, and lakes? Please check a response for each source listed below. ("Runoff" is rainfall or snow melt that runs off roofs, pavement, lawns, fields, and other surfaces instead of seeping into the ground.)

	Very Significant	Significant	Not Significant	Don't Know	Total
Sewage treatment plants:	342(44.13%)	188(24.26%)	160(20.65%)	85(10.97%)	775
Air pollutants (like acid rain or exhaust):	209(26.79%)	382(48.97%)	131(16.79%)	58(7.44%)	780
Runoff from parking areas and streets:	275(35.3%)	391(50.19%)	75(9.63%)	38(4.88%)	779
Runoff from farms:	316(40.46%)	302(38.67%)	95(12.16%)	68(8.71%)	781
Runoff from forested or undeveloped land:	44(5.63%)	155(19.82%)	519(66.37%)	64(8.18%)	782
Runoff from residential development:	258(33.25%)	395(50.9%)	77(9.92%)	46(5.93%)	776
Runoff from commercial development:	386(49.36%)	315(40.28%)	44(5.63%)	37(4.73%)	782
Runoff from construction sites:	403(51.67%)	290(37.18%)	46(5.9%)	41(5.26%)	780
Stream bank erosion:	145(18.71%)	318(41.03%)	221(28.52%)	91(11.74%)	775
Oil, grease, household chemicals, trash, and other wastes illegally dumped in storm drains or ditches:	492(62.84%)	211(26.95%)	33(4.21%)	47(6%)	783
Fuel or chemical spills:	499(63.81%)	161(20.59%)	71(9.08%)	51(6.52%)	782
Leaks from septic systems:	362(46.71%)	265(34.19%)	74(9.55%)	74(9.55%)	775
Leaks or spills from sanitary sewer systems:	380(48.72%)	241(30.9%)	81(10.38%)	78(10%)	780
Improperly applied fertilizers and pesticides:	454(58.06%)	243(31.07%)	38(4.86%)	47(6.01%)	782
			Total Responded to this question:	783	98.74%
			Total who skipped this question:	10	1.26%
			Total:	793	100%



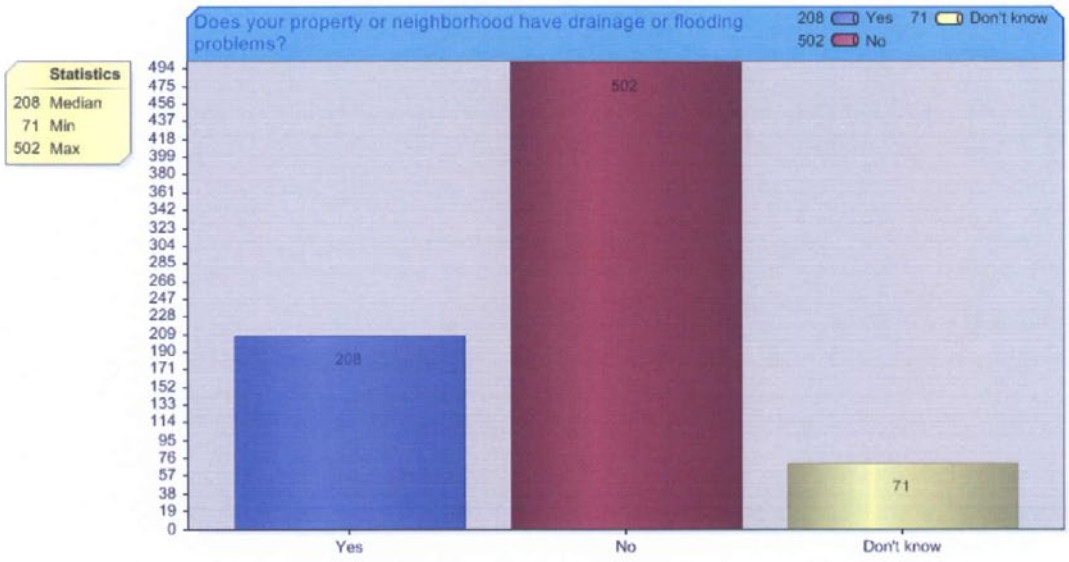
12. From your observations, how well do storm drains, drainage culverts under roadways, drainage ditches and channels generally function within Chapel Hill? They...

	Responses	Percent
work very well with no problems:	32	4.06%
seem to work ok in most storms:	379	48.04%
occasionally back up water and flood some streets:	282	35.74%
often fail to work well and are a major public safety concern:	27	3.42%
Don't know:	69	8.75%
Total Responded to this question:	789	99.5%
Total who skipped this question:	4	0.5%
Total:	793	100%



13. Does your property or neighborhood have drainage or flooding problems?

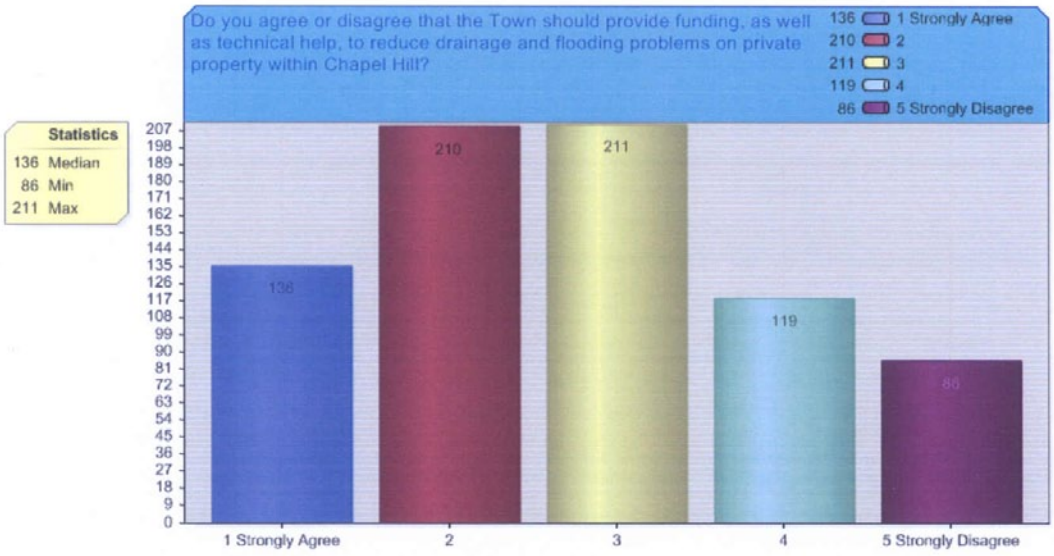
	Responses	Percent
Yes:	208	26.63%
No:	502	64.28%
Don't know:	71	9.09%
Total Responded to this question:	781	98.49%
Total who skipped this question:	12	1.51%
Total:	793	100%



14. Do you agree or disagree that the Town should provide funding, as well as technical help, to reduce drainage

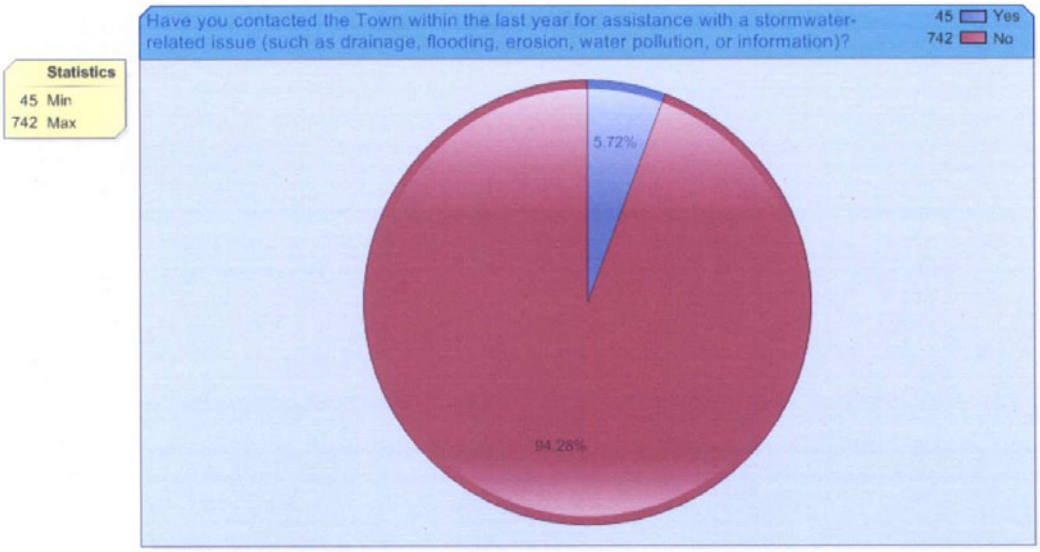
and flooding problems on private property within Chapel Hill?

	Responses	Percent
1 Strongly Agree:	136	17.85%
2:	210	27.56%
3:	211	27.69%
4:	119	15.62%
5 Strongly Disagree:	86	11.29%
Total Responded to this question:	762	96.09%
Total who skipped this question:	31	3.91%
Total:	793	100%



15. Have you contacted the Town within the last year for assistance with a stormwater-related issue (such as drainage, flooding, erosion, water pollution, or information)?

	Responses	Percent
Yes:	45	5.72%
No:	742	94.28%
Total Responded to this question:	787	99.24%
Total who skipped this question:	6	0.76%
Total:	793	100%



Survey Methods

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Survey Creation, Deployment, & Analysis Tools for Businesses

Analyze Survey Results - Results Summary

Survey: Town of Chapel Hill Stormwater Services Survey

The data below represents this survey's consolidated results. To conduct analysis on what types of individuals answered questions in a particular way, click on the Create Criteria button.

Survey Status		Respondent Statistics		Points Summary:
Status:	Closed	**Total Responses:**	793	No Points Questions used in this survey.
Deploy Date:	10/24/2006	**Completes:**	785	
Closed Date:	11/27/2006	**Partials:**	8	

Convert to PDF

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Create Display Criteria

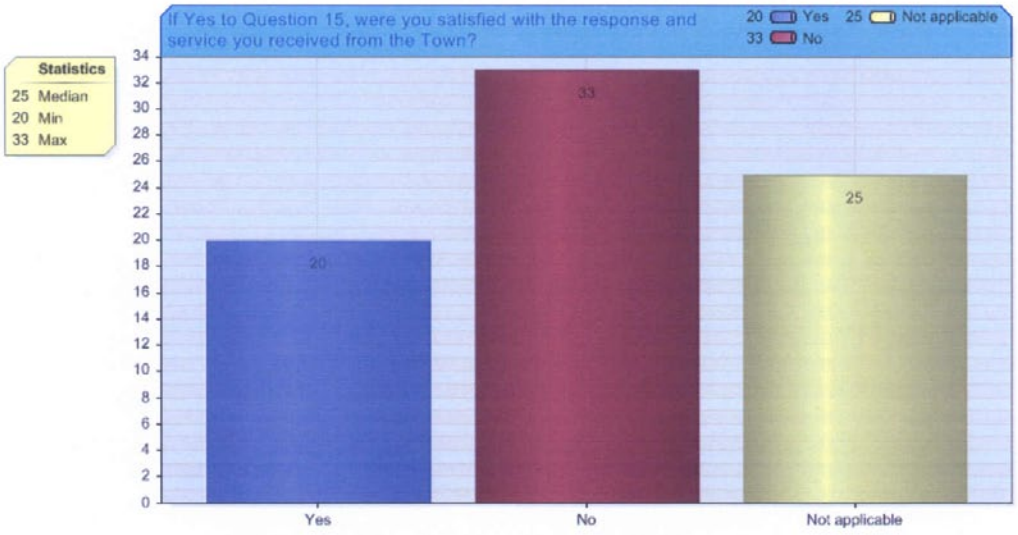
Criteria Active: 0 Create Criteria

View Questions: 16 to 20

Summarized Data Report - Survey: Town of Chapel Hill Stormwater Services Survey

16. If Yes to Question 15, were you satisfied with the response and service you received from the Town?

	Responses	Percent
Yes:	20	25.64%
No:	33	42.31%
Not applicable:	25	32.05%
Total Responded to this question:	78	9.84%
Total who skipped this question:	715	90.16%
Total:	793	100%



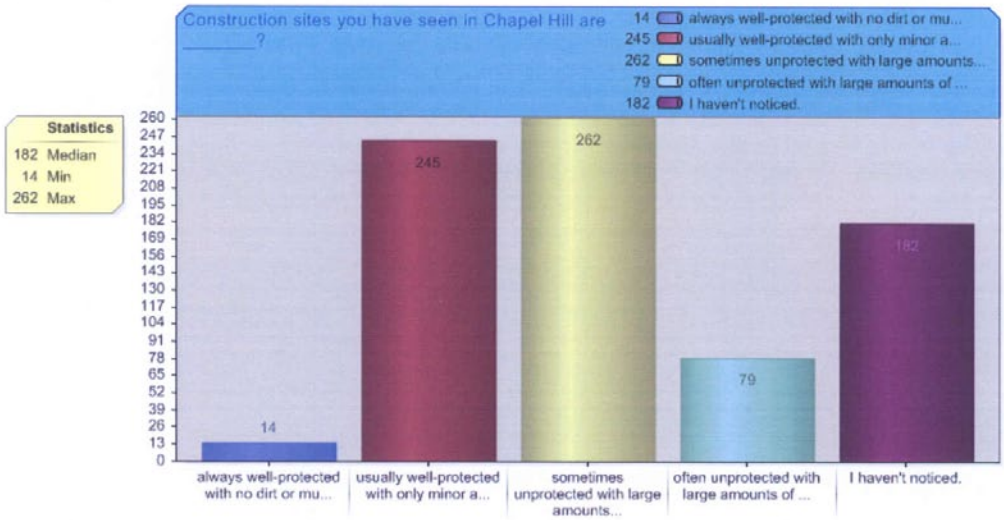
17. If No to Question 16, please explain why.

	Responses	Percent
Responses:	111	100%
Total Responded to this question:	111	14%
Total who skipped this question:	682	86%
Total:	793	100%

Graph/Chart function not relevant for this question type.

18. Construction sites you have seen in Chapel Hill are _____?

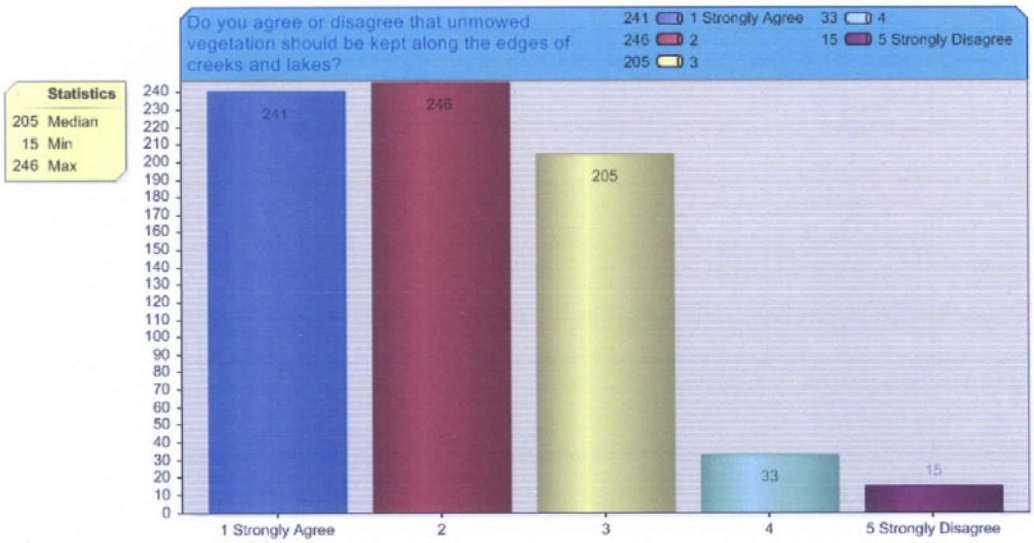
	Responses	Percent
always well-protected with no dirt or mud leaving the sites.:	14	1.79%
usually well-protected with only minor amounts of dirt or mud leaving the sites.:	245	31.33%
sometimes unprotected with large amounts of dirt or mud leaving the sites.:	262	33.5%
often unprotected with large amounts of dirt or mud leaving the sites.:	79	10.1%
I haven't noticed.:	182	23.27%
Total Responded to this question:	782	98.61%
Total who skipped this question:	11	1.39%
Total:	793	100%



19. Do you agree or disagree that unmowed vegetation should be kept along the edges of creeks and lakes?

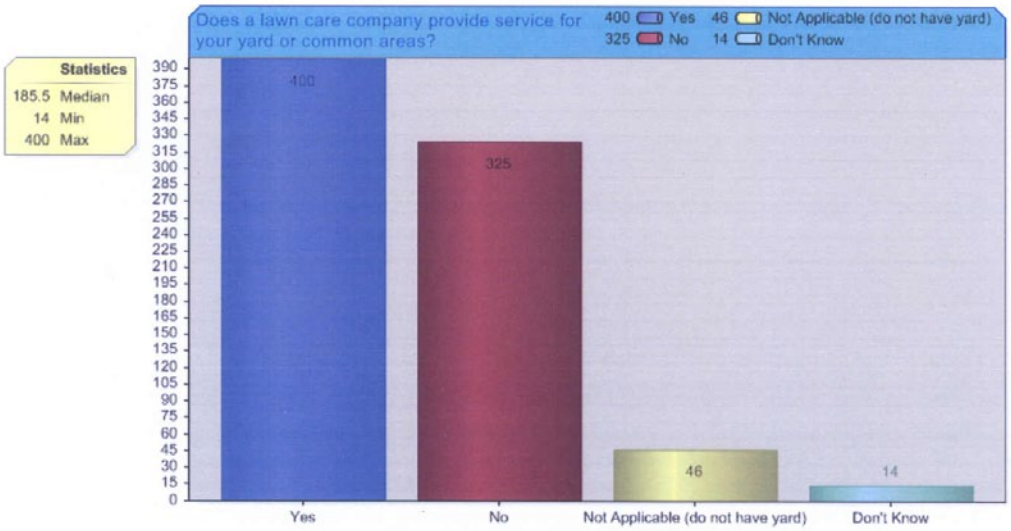
	Responses	Percent
1 Strongly Agree:	241	32.57%
2:	246	33.24%
3:	205	27.7%
4:	33	4.46%
5 Strongly Disagree:	15	2.03%

Total Responded to this question:	740	93.32%
Total who skipped this question:	53	6.68%
Total:	793	100%



20. Does a lawn care company provide service for your yard or common areas?

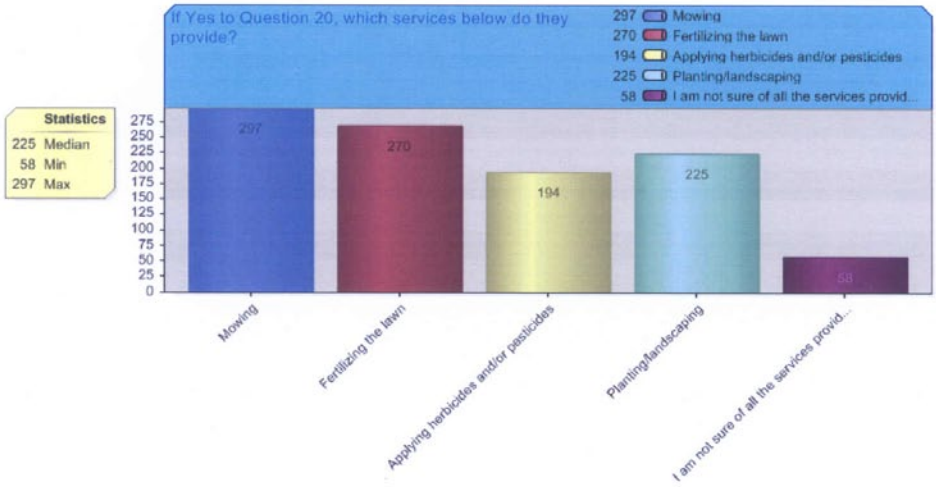
	Responses	Percent
Yes:	400	50.96%
No:	325	41.4%
Not Applicable (do not have yard):	46	5.86%
Don't Know:	14	1.78%
Total Responded to this question:	785	98.99%
Total who skipped this question:	8	1.01%
Total:	793	100%



Summarized Data Report - Survey: Town of Chapel Hill Stormwater Services Survey

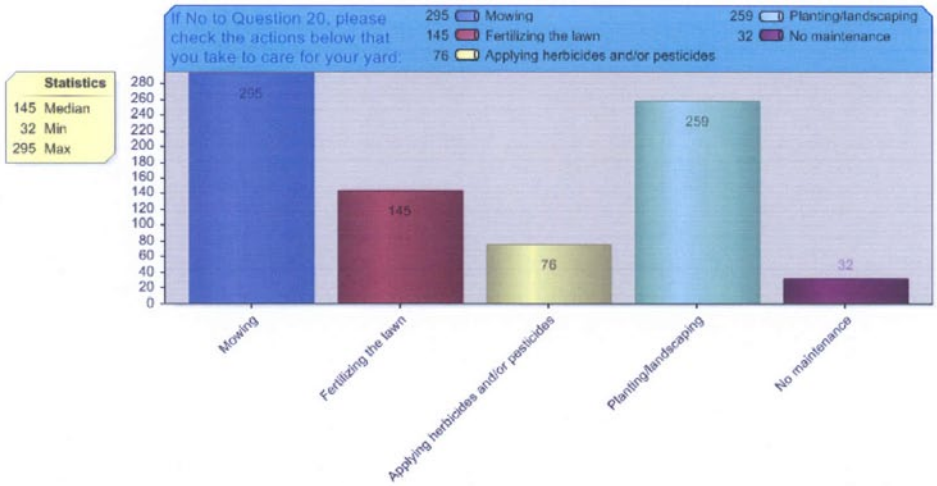
21. If Yes to Question 20, which services below do they provide?

	Responses	Percent
Mowing:	297	72.26%
Fertilizing the lawn:	270	65.69%
Applying herbicides and/or pesticides:	194	47.2%
Planting/landscaping:	225	54.74%
I am not sure of all the services provided:	58	14.11%
Total Responded to this question:	411	51.83%
Total who skipped this question:	382	48.17%
Total:	793	100%



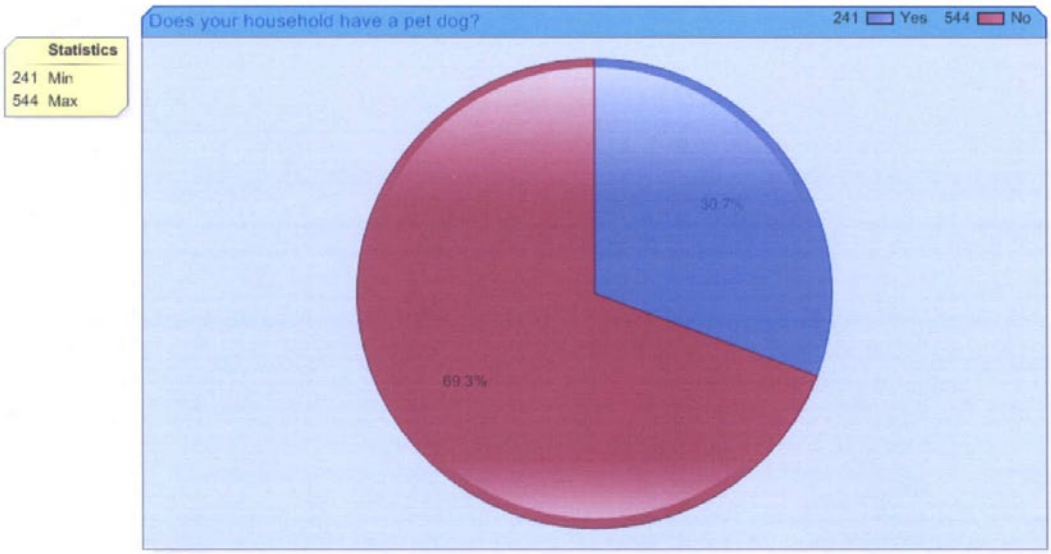
22. If No to Question 20, please check the actions below that you take to care for your yard:

	Responses	Percent
Mowing:	295	81.04%
Fertilizing the lawn:	145	39.84%
Applying herbicides and/or pesticides:	76	20.88%
Planting/landscaping:	259	71.15%
No maintenance:	32	8.79%
Total Responded to this question:	364	45.9%
Total who skipped this question:	429	54.1%
Total:	793	100%



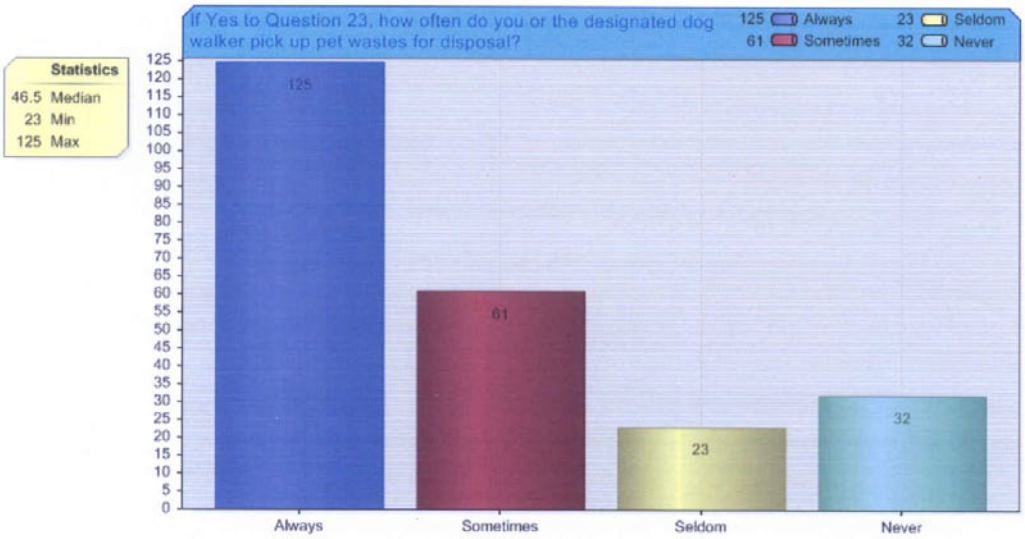
23. Does your household have a pet dog?

	Responses	Percent
Yes:	241	30.7%
No:	544	69.3%
Total Responded to this question:	785	98.99%
Total who skipped this question:	8	1.01%
Total:	793	100%



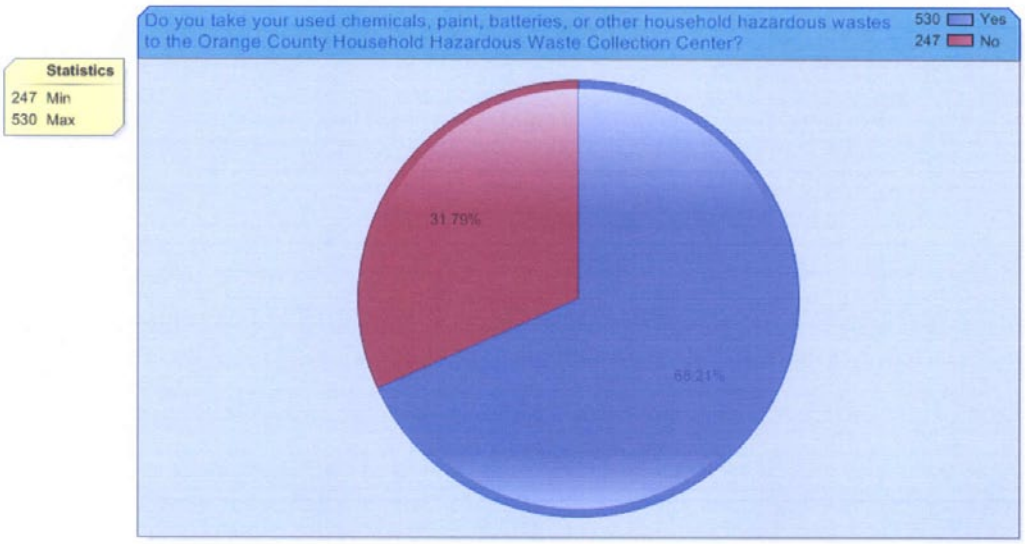
24. If Yes to Question 23, how often do you or the designated dog walker pick up pet wastes for disposal?

	Responses	Percent
Always:	125	51.87%
Sometimes:	61	25.31%
Seldom:	23	9.54%
Never:	32	13.28%
Total Responded to this question:	241	30.39%
Total who skipped this question:	552	69.61%
Total:	793	100%



25. Do you take your used chemicals, paint, batteries, or other household hazardous wastes to the Orange County Household Hazardous Waste Collection Center?

	Responses	Percent
Yes:	530	68.21%
No:	247	31.79%
Total Responded to this question:	777	97.98%
Total who skipped this question:	16	2.02%
Total:	793	100%



Survey Methods

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Analyze Survey Results - Results Summary

Survey: Town of Chapel Hill Stormwater Services Survey

The data below represents this survey's consolidated results. To conduct analysis on what types of individuals answered questions in a particular way, click on the Create Criteria button.

Survey Status		Respondent Statistics		Points Summary:
Status:	Closed	Total Responses:	793	No Points Questions used in this survey.
Deploy Date:	10/24/2006	Completes:	785	
Closed Date:	11/27/2006	Partials:	8	

Convert to PDF

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Create Display Criteria

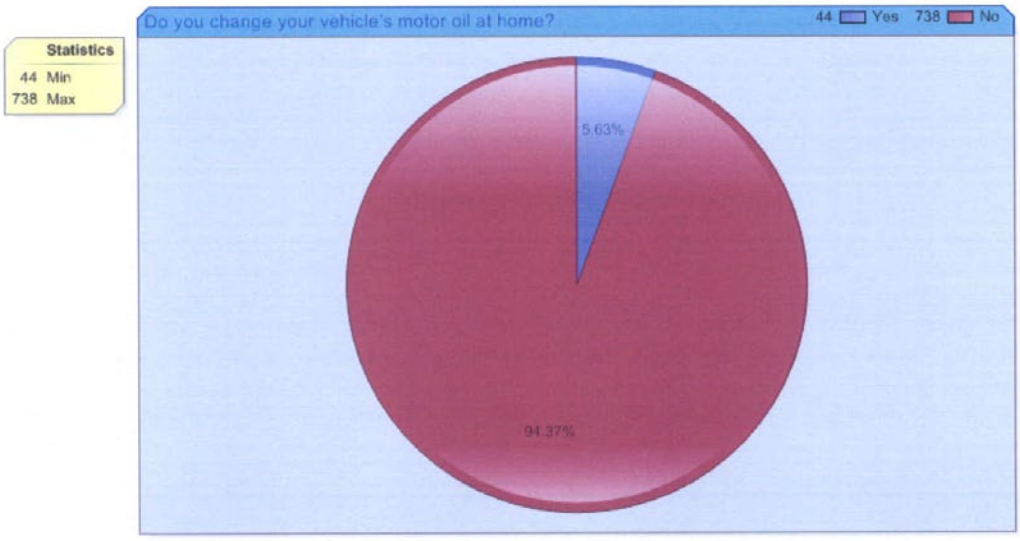
Criteria Active: 0 Create Criteria

View Questions: 26 to 30

Summarized Data Report - Survey: Town of Chapel Hill Stormwater Services Survey

26. Do you change your vehicle's motor oil at home?

	Responses	Percent
Yes:	44	5.63%
No:	738	94.37%
Total Responded to this question:	782	98.61%
Total who skipped this question:	11	1.39%
Total:	793	100%



27. If Yes to Question 26, what do you do with the used motor oil?

	Responses	Percent
Responses:	44	100%
Total Responded to this question:	44	5.55%
Total who skipped this question:	749	94.45%
Total:	793	100%

Graph/Chart function not relevant for this question type.

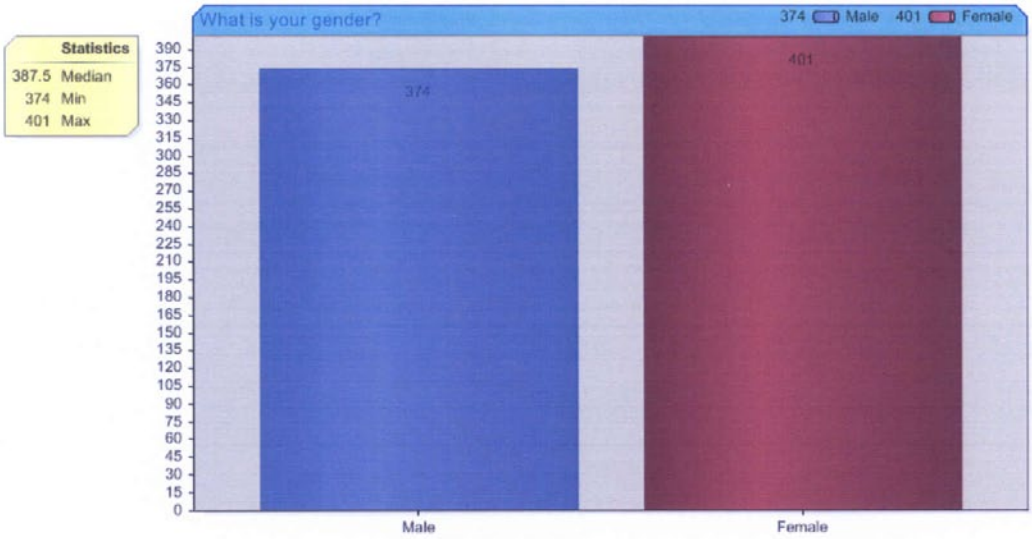
28. Please share any comments, concerns, questions, or suggestions that you may have regarding the Town's stormwater management programs and services:

	Responses	Percent
Responses:	156	100%
Total Responded to this question:	156	19.67%
Total who skipped this question:	637	80.33%
Total:	793	100%

Graph/Chart function not relevant for this question type.

29. What is your gender?

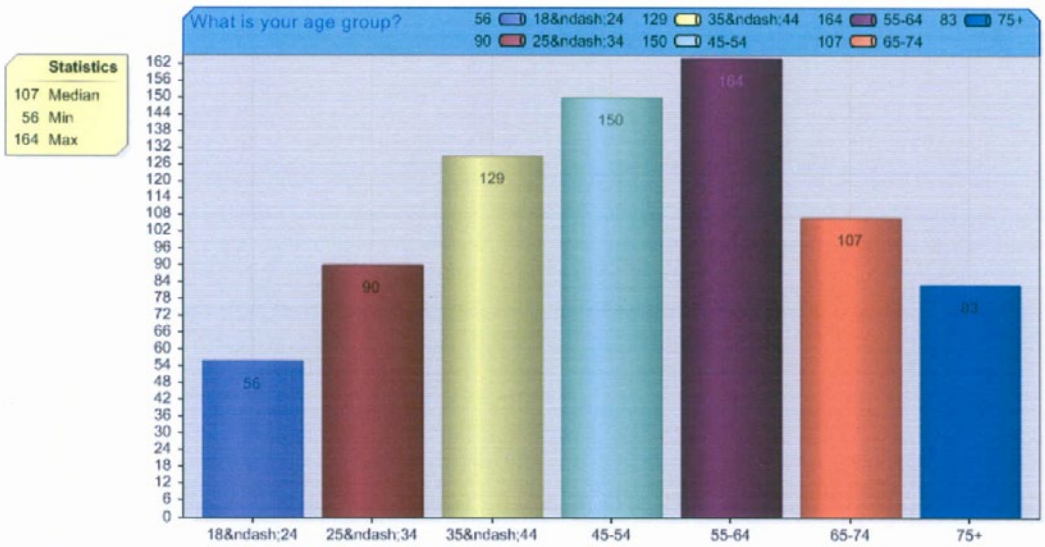
	Responses	Percent
Male:	374	48.26%
Female:	401	51.74%
Total Responded to this question:	775	97.73%
Total who skipped this question:	18	2.27%
Total:	793	100%



30. What is your age group?

	Responses	Percent
18–24:	56	7.19%
25–34:	90	11.55%

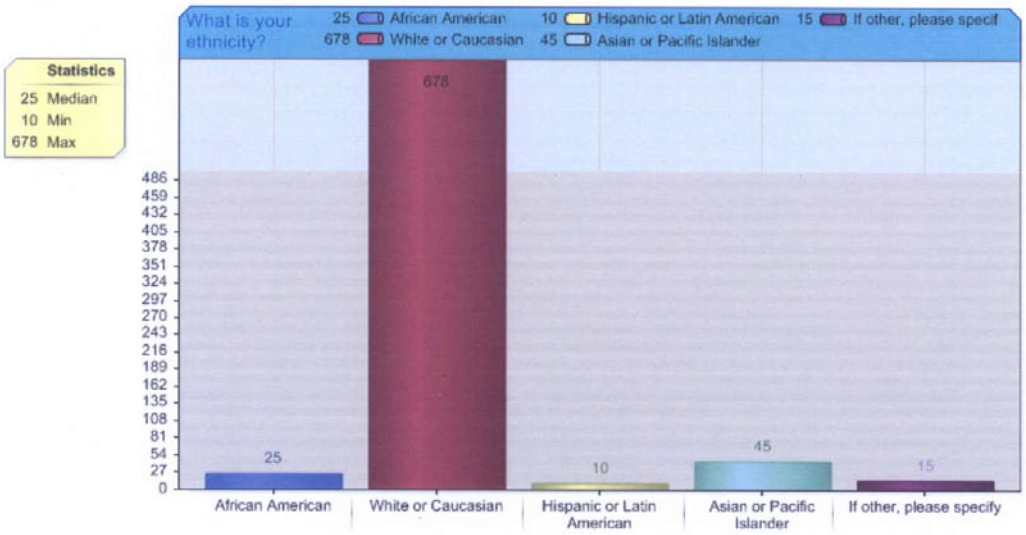
35-44:	129	16.56%
45-54:	150	19.26%
55-64:	164	21.05%
65-74:	107	13.74%
75+:	83	10.65%
Total Responded to this question:	779	98.23%
Total who skipped this question:	14	1.77%
Total:	793	100%



Summarized Data Report - Survey: Town of Chapel Hill Stormwater Services Survey

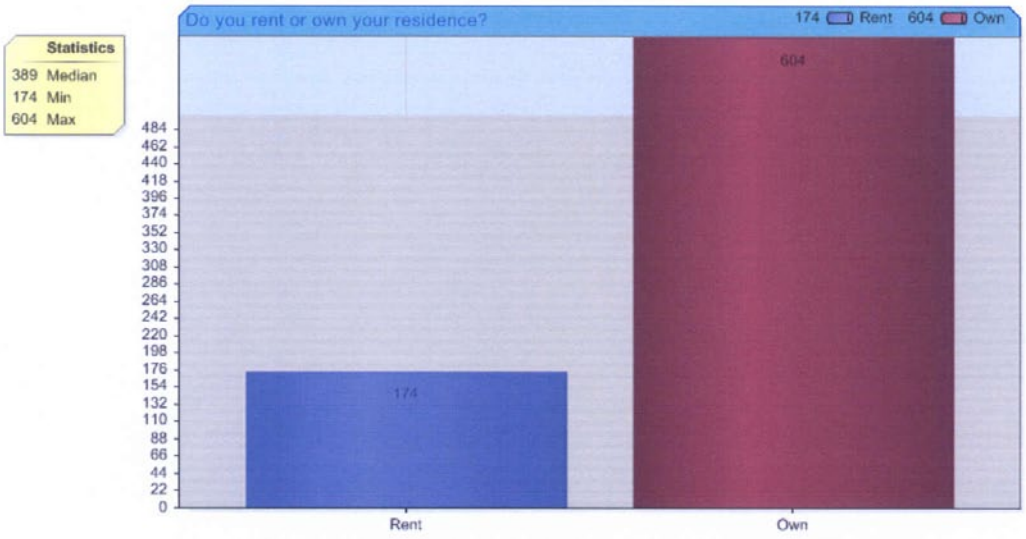
31. What is your ethnicity?

	Responses	Percent
African American:	25	3.23%
White or Caucasian:	678	87.71%
Hispanic or Latin American:	10	1.29%
Asian or Pacific Islander:	45	5.82%
If other, please specify:	15	1.94%
Total Responded to this question:	773	97.48%
Total who skipped this question:	20	2.52%
Total:	793	100%



32. Do you rent or own your residence?

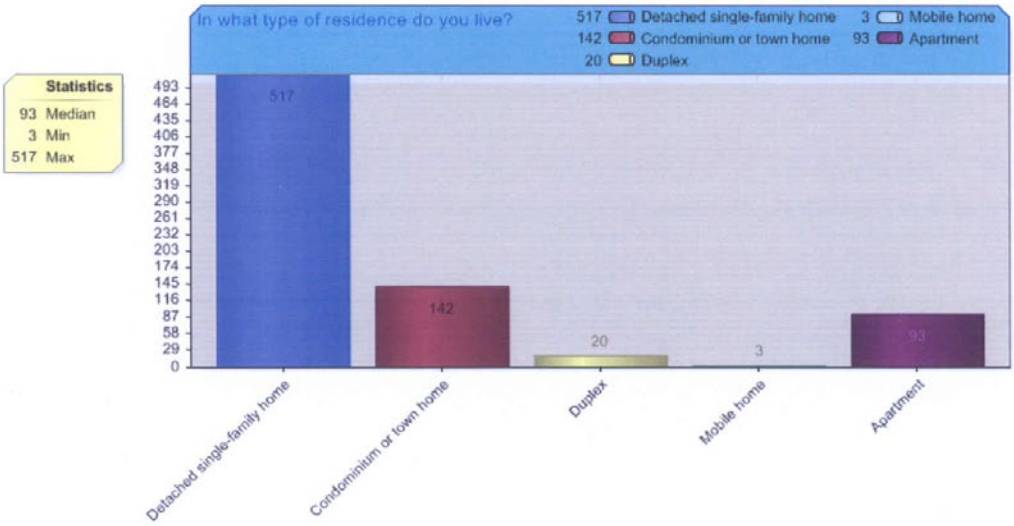
	Responses	Percent
Rent:	174	22.37%
Own:	604	77.63%
Total Responded to this question:	778	98.11%
Total who skipped this question:	15	1.89%
Total:	793	100%



33. In what type of residence do you live?

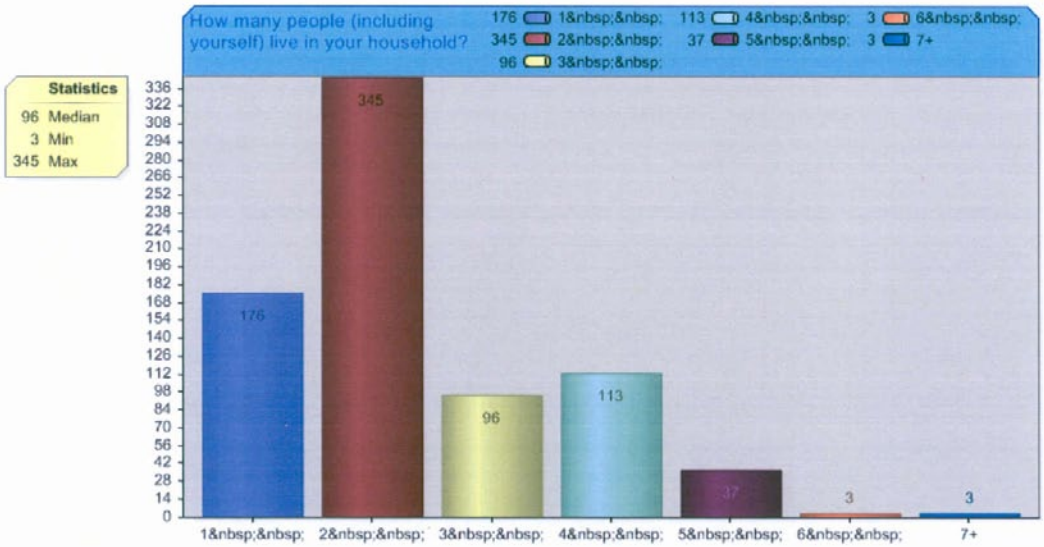
	Responses	Percent

Detached single-family home:	517	66.71%
Condominium or town home:	142	18.32%
Duplex:	20	2.58%
Mobile home:	3	0.39%
Apartment:	93	12%
Total Responded to this question:	775	97.73%
Total who skipped this question:	18	2.27%
Total:	793	100%



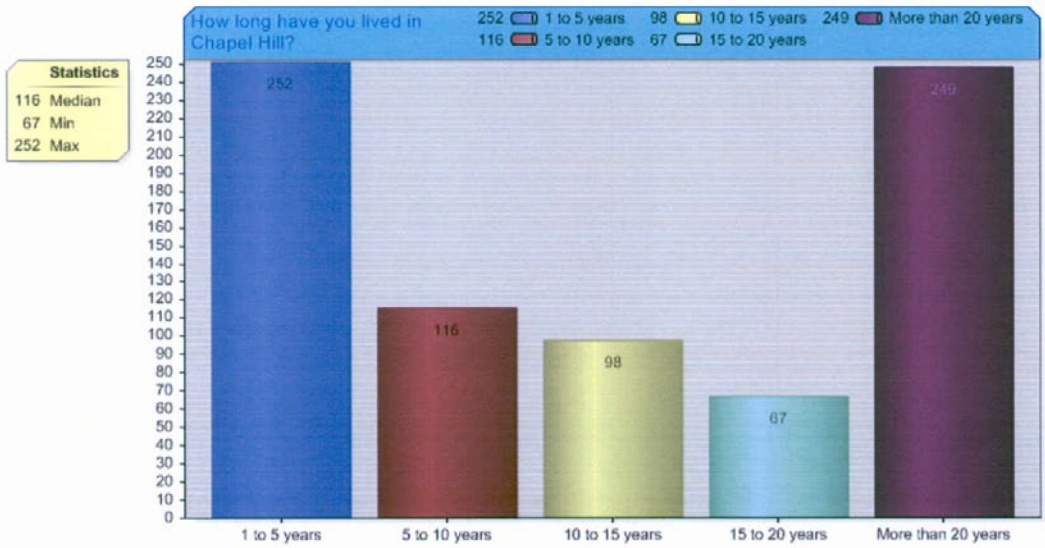
34. How many people (including yourself) live in your household?

	Responses	Percent
1 :	176	22.77%
2 :	345	44.63%
3 :	96	12.42%
4 :	113	14.62%
5 :	37	4.79%
6 :	3	0.39%
7+:	3	0.39%
Total Responded to this question:	773	97.48%
Total who skipped this question:	20	2.52%
Total:	793	100%



35. How long have you lived in Chapel Hill?

	Responses	Percent
1 to 5 years:	252	32.23%
5 to 10 years:	116	14.83%
10 to 15 years:	98	12.53%
15 to 20 years:	67	8.57%
More than 20 years:	249	31.84%
Total Responded to this question:	782	98.61%
Total who skipped this question:	11	1.39%
Total:	793	100%



Survey Methods

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Analyze Survey Results - Results Summary

Survey: Town of Chapel Hill Stormwater Services Survey

The data below represents this survey's consolidated results. To conduct analysis on what types of individuals answered questions in a particular way, click on the Create Criteria button.

Survey Status		Respondent Statistics		Points Summary:
Status:	Closed	Total Responses:	793	No Points Questions used in this survey.
Deploy Date:	10/24/2006	Completes:	785	
Closed Date:	11/27/2006	Partials:	8	

Convert to PDF

Email PDF

Create Display Criteria

Criteria Active: 0 Create Criteria

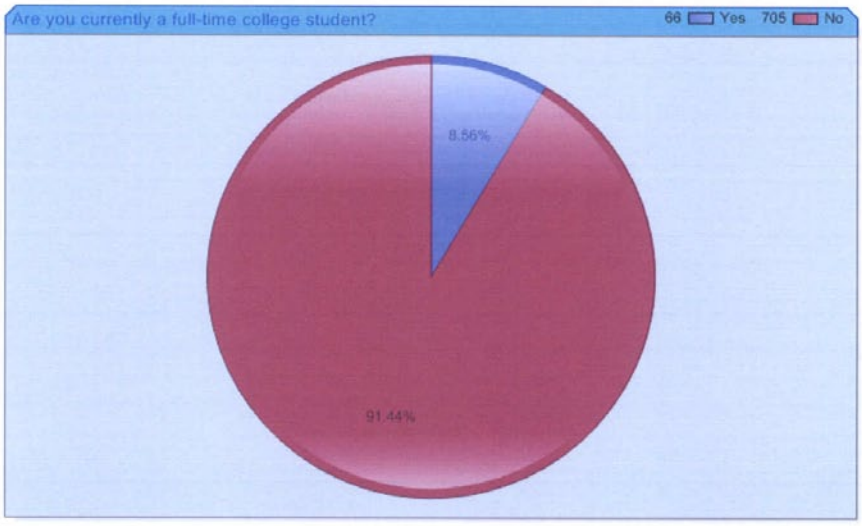
View Questions: 36 to 39

Summarized Data Report - Survey: Town of Chapel Hill Stormwater Services Survey

36. Are you currently a full-time college student?

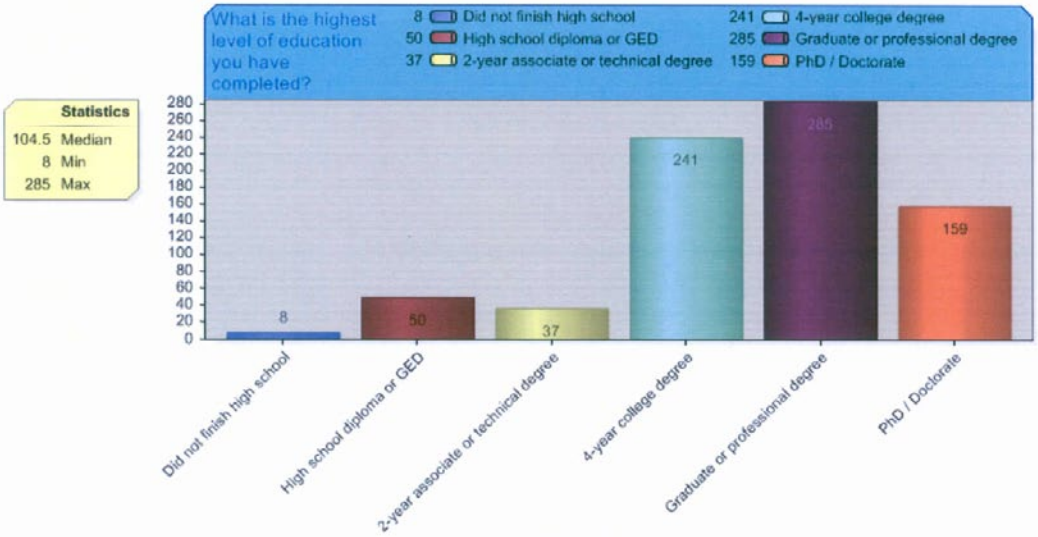
	Responses	Percent
Yes:	66	8.56%
No:	705	91.44%
Total Responded to this question:	771	97.23%
Total who skipped this question:	22	2.77%
Total:	793	100%

Statistics
66 Min
705 Max



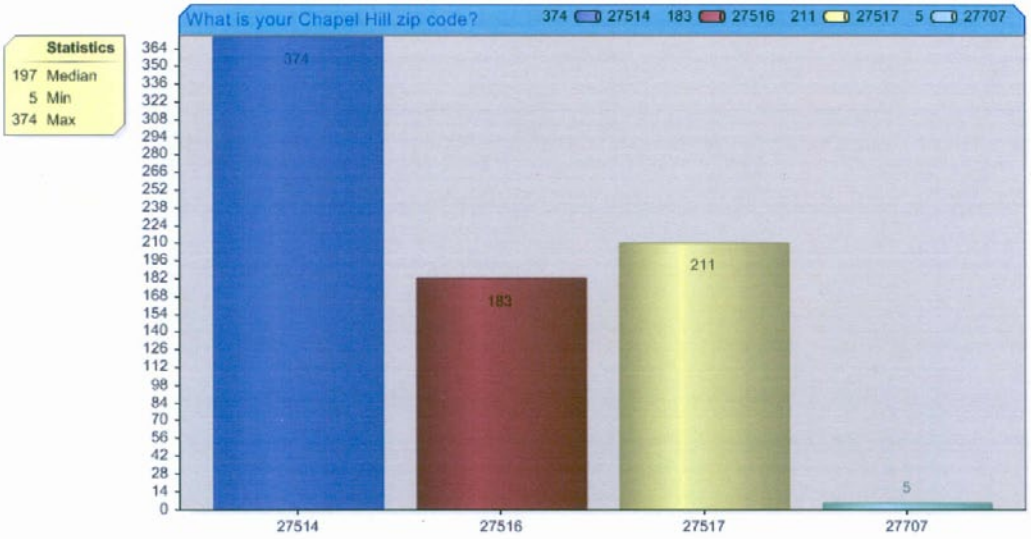
37. What is the highest level of education you have completed?

	Responses	Percent
Did not finish high school:	8	1.03%
High school diploma or GED:	50	6.41%
2-year associate or technical degree:	37	4.74%
4-year college degree:	241	30.9%
Graduate or professional degree:	285	36.54%
PhD / Doctorate:	159	20.38%
Total Responded to this question:	780	98.36%
Total who skipped this question:	13	1.64%
Total:	793	100%



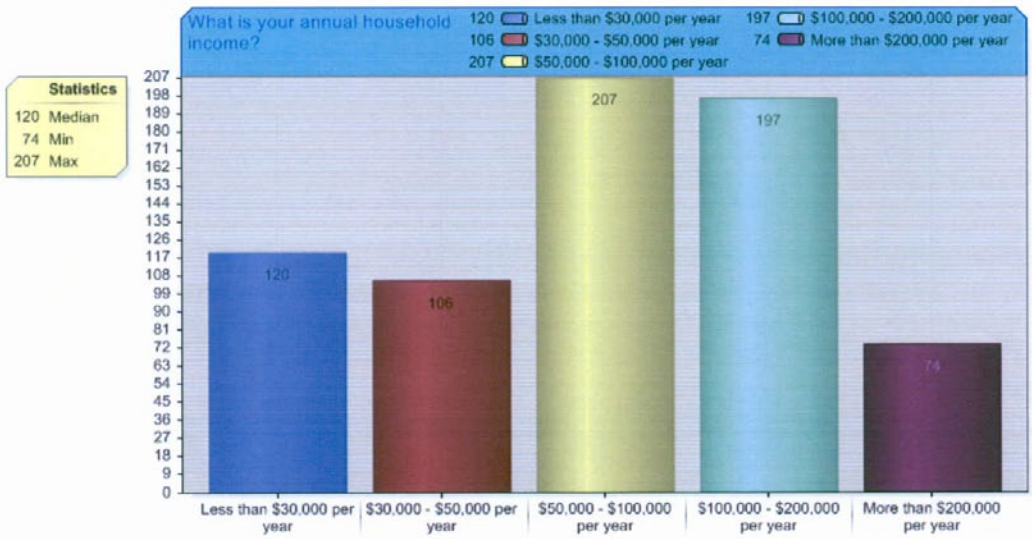
38. What is your Chapel Hill zip code?

	Responses	Percent
27514:	374	48.38%
27516:	183	23.67%
27517:	211	27.3%
27707:	5	0.65%
Total Responded to this question:	773	97.48%
Total who skipped this question:	20	2.52%
Total:	793	100%



39. What is your annual household income?

	Responses	Percent
Less than $30,000 per year:	120	17.05%
$30,000 - $50,000 per year:	106	15.06%
$50,000 - $100,000 per year:	207	29.4%
$100,000 - $200,000 per year:	197	27.98%
More than $200,000 per year:	74	10.51%
Total Responded to this question:	704	88.78%
Total who skipped this question:	89	11.22%
Total:	793	100%



Appendix 6 - North Carolina Municipal Stormwater Utility Survey (June 2007)

Thanks to the Stormwater Managers and Staff from participating local programs. Facilitated by JEWELL Engineering Consultants, PC in support of the UNC School of Government Environmental Finance Center

Contact for more information: Scott Bryant, PE, JEWELL Engineering Consultants, PC Office Tel 336-996-9974 ext. 2 Mobile Tel 336-972-9941 Email sbryant@jewellengr.com Web www.jewellengr.com

Summary Analysis by Fiscal Year, FY:	FY 07-08					FY 06-07					FY 03-04				
Participating NPDES Phase Is:	Charlotte, Raleigh, Greensboro, Durham, Winston-Salem, Fayetteville					Charlotte, Raleigh, Greensboro, Durham, Winston-Salem, Fayetteville					Charlotte, Raleigh, Greensboro, Durham, Winston-Salem, Fayetteville				
Participating NPDES Phase IIs:	Wilson, Concord, Rocky Mount, Asheville, Chapel Hill, Wilmington, Gastonia, High Point, Greenville, Jacksonville, Kannapolis					Wilson, Concord, Rocky Mount, Asheville, Chapel Hill, Wilmington, Clemmons Gastonia, High Point, Greenville, Kernersville					Wilson, Wilmington				
Survey:	**MEAN**	**MEDIAN**	**LOW**	**HIGH**	**STD DEV**	**MEAN**	**MEDIAN**	**LOW**	**HIGH**	**STD DEV**	**MEAN**	**MEDIAN**	**LOW**	**HIGH**	**STD DEV**
NPDES MS4 Phase 1 or Phase 2 Program?															
Total jurisdictional area served by stormwater utility (in square miles)	78.9	51.0	21.1	280.5	65.8	76.0	51.0	12.0	280.5	67.9	114.9	113.3	27.0	268.0	71.7
Total population served by stormwater utility	153,572	73,121	40,000	651,101	157,263	148,525	72,231	16,045	651,101	160,171	231,314	188,518	47,000	594,760	168,809
Total Annual Budgeted Stormwater Revenue ($)	$6,812,303	$3,070,206	$1,549,500	$37,500,000	$8,838,521	$5,832,581	$2,722,187	$502,000	$34,800,000	$8,337,087	$8,453,421	$5,832,798	$2,100,000	$26,111,899	$7,864,187
Are grant funds included within total annual budgeted stormwater revenue? (Yes or No)															
Total amount of grant funding included within total annual budgeted stormwater revenue ($)															
How is stormwater utility user fee billed?															
Average Single-Family Residential fee rate ($/month)	$4.01	$3.75	$1.00	$9.00	$2.05	$3.60	$3.50	$1.00	$7.06	$1.66	$3.36	$3.39	$1.00	$5.24	$1.40
Equivalent Residential Unit, ERU (in square feet)	2,591	2,543	2,000	3,462	398	2,601	2,543	2,000	3,952	481	2,452	2,500	2,260	2,613	146
Tiered system for Single-Family Residential, SFR? (Yes or No)															
If tiered system for SFR, number of tiers															
Fee rate ($) per month & range (in sq. ft.) for first tier, if applicable															
Fee rate ($) per month & range for second tier, if applicable															
Fee rate ($) per month & range for third tier, if applicable															
Fee rate ($) per month & range for fourth tier, if applicable															
Is there a stormwater utility fee crediting policy/program? (Yes or No)															
Maximum potential fee credit (%)	63	55	40	100	25	68	68	40	100	26	64	50	40	100	28
Number of utility customers participating in fee crediting program	66	28	2	250	96	66	28	1	250	96	10	2	2	25	13
Budgeted Annual Expenditures (as % of total budgeted revenue) by major program area / program function:															
Administration (program management, utility & billing administration, general administrative costs)	10	8	2	27	7	12	10	3	27	7	12	12	4	19	5
NPDES/Water Quality (NPDES, TMDL, Basinwide water quality rules, watershed protection, etc.)	12	7	3	33	10	12	6	3	33	12	14	8	3	38	14
Planning & Engineering (Master planning, inventory, engineering, plan review, etc.)	10	8	5	20	5	10	8	1	21	7	6	5	0	16	6
Public Education & Outreach	2	1	1	4	1	2	2	1	7	2	2	2	1	4	1
Drainage System Operation & Maintenance (MS4 O&M, street sweeping, and related SW maintenance)	33	37	13	52	14	34	34	13	52	12	43	45	33	56	8
Capital Improvement Program (CIP)	31	28	15	69	16	28	27	7	69	20	19	21	2	33	12
Other (inspections and enforcement, etc.), if applicable	4	4	2	5	2	3	3	2	4	1					
Debt Service, if applicable	9	10	0	18	7	6	5	0	17	7	6	0	0	24	10
Fund Reserve, if applicable	12	12	10	14	3	8	8	5	10	3					
Total of Budgeted Expenditures by Program Area (~ 100%)	100	100	100	100	0	100	100	100	100	0	100	100	100	100	0
Does Utility have a formal fund balance/retained earnings/fund reserve policy? If yes, what is policy?															
What is the approximate current Fund Balance ($) for the Stormwater Utility Fund?	$1,269,472	$508,578	$200,000	$3,900,000	$1,518,984	$4,529,432	$1,241,803	$302,316	$20,000,000	$7,693,142	Not in 2004 survey				
Has debt financing been used by the utility (i.e., bonds for capital projects, etc.)?															
Level of current debt financing, if applicable ($)															
Total Full-Time Equivalent (FTE) positions supported by the Stormwater Utility Fund	41	30	10	92	28	38	30	6	90	30	50	51	13	77	21
FTEs by major stormwater program area or program function:															
Administration/Program Management	5	3	1	15	5	4	2	1	15	5	5	3	2	9	3
Public Education	1	1	1	2	0	1	1	1	2	0	2	1	1	4	2
Water Quality	4	3	1	10	3	3	3	1	10	3	4	4	1	7	2
Planning & Engineering	7	2	0	21	9	6	2	0	21	8	6	6	0	17	6
Drainage System Operation & Maintenance	27	23	7	60	20	26	23	2	60	21	34	37	6	55	19
Other (Inspections, etc.)	5	5	1	10	6	3	1	1	9	5	8	8	6	10	3
Summary Analysis by Fiscal Year:	**MEAN**	**MEDIAN**	**LOW**	**HIGH**	**STD DEV**	**MEAN**	**MEDIAN**	**LOW**	**HIGH**	**STD DEV**	**MEAN**	**MEDIAN**	**LOW**	**HIGH**	**STD DEV**
Annual Revenue per Square Mile of Service Area ($/sq mi)	$78,286	$71,235	$16,800	$133,690	$32,047	$73,510	$67,294	$16,800	$124,064	$34,559	$72,716	$78,525	$16,800	$113,051	$31,379
Annual Revenue per Acre of Service Area ($/ac)	$122.32	$111.31	$26.25	$208.89	$50.07	$114.86	$105.15	$26.25	$193.85	$54.00	$113.62	$122.70	$26.25	$176.64	$49.03
Annual Revenue per Person Served ($/person)	$42.34	$39.10	$11.05	$66.67	$13.46	$40.91	$35.25	$11.05	$77.20	$16.96	$36.89	$38.25	$11.05	$62.67	$15.24
Avg. Monthly Fee Rate per 1,000 square feet of impervious area ($/1,000 sq ft)	$1.55	$1.39	$0.44	$3.25	$0.76	$1.41	$1.14	$0.39	$3.25	$0.78	$1.33	$1.14	$0.44	$2.01	$0.59
Avg. Monthly Fee Rate per acre of impervious area ($/acre)	$67.45	$60.62	$19.22	$141.57	$33.03	$61.37	$49.54	$16.83	$141.57	$33.80	$57.94	$49.54	$19.22	$87.35	$25.66
Approx. Annual Expenditures ($) per Square Mile by Major Program:															
Administration	$6,579	$5,699	$1,344	$15,239	$4,326	$7,193	$5,642	$1,344	$15,046	$4,016	$8,892	$7,551	$1,344	$20,349	$6,187
Water Quality	$6,180	$4,986	$1,693	$12,390	$3,742	$6,358	$4,520	$1,103	$14,828	$4,582	$6,312	$5,005	$2,923	$12,575	$3,730
Planning & Engineering	$7,197	$5,217	$840	$13,369	$4,756	$6,495	$4,908	$473	$15,982	$5,264	$5,736	$5,908	$419	$10,220	$4,224
Public Education	$1,102	$956	$584	$2,471	$614	$1,609	$934	$567	$5,301	$1,520	$910	$884	$672	$1,251	$198
System Operation & Maintenance	$26,334	$24,108	$5,712	$56,827	$17,050	$25,208	$23,777	$4,779	$55,038	$15,861	$32,752	$32,442	$5,712	$63,308	$17,500
Capital Improvement Program (CIP)	$23,007	$19,755	$2,688	$46,791	$14,085	$20,066	$15,549	$2,688	$46,679	$16,533	$14,546	$15,269	$2,096	$30,661	$11,752
Other (Inspections, etc.)	$3,481	$3,481	$1,304	$5,658	$3,078	$2,803	$2,803	$1,871	$3,734	$1,318					
Debt Service, if applicable (typically used for capital programs)	$14,705	$15,333	$4,090	$24,064	$8,197	$13,750	$14,358	$5,802	$21,091	$7,662	$16,148	$17,538	$3,773	$27,132	$11,742
Fund Reserve	$11,181	$11,181	$6,521	$15,841	$6,591	$4,430	$4,430	$4,132	$4,728	$422					
Total FTEs (funded by utility) per Square Mile of Service Area	0.544	0.481	0.190	1.157	0.299	0.521	0.411	0.185	1.157	0.313	0.518	0.441	0.240	1.118	0.283
Total FTEs (funded by utility) per Thousand Persons Served	0.303	0.274	0.126	0.740	0.176	0.297	0.257	0.105	0.740	0.183	0.274	0.257	0.129	0.620	0.159
FTEs by Major Stormwater Program Area per Square Mile Served:															
Administration	0.057	0.047	0.018	0.157	0.044	0.057	0.053	0.015	0.157	0.042	0.051	0.033	0.018	0.118	0.037
Public Education	0.021	0.014	0.007	0.047	0.017	0.020	0.014	0.007	0.047	0.016	0.011	0.010	0.008	0.015	0.003
Water Quality	0.041	0.036	0.019	0.095	0.022	0.033	0.030	0.019	0.047	0.009	0.036	0.036	0.024	0.053	0.010
Planning & Engineering	0.071	0.057	0.015	0.153	0.052	0.063	0.059	0.008	0.156	0.045	0.061	0.054	0.009	0.134	0.046
System Operation & Maintenance	0.335	0.296	0.130	1.000	0.246	0.314	0.281	0.122	1.000	0.255	0.366	0.312	0.047	1.000	0.290
Other (Inspections, etc.)	0.059	0.059	0.045	0.073	0.020	0.048	0.045	0.030	0.067	0.018	0.073	0.073	0.068	0.079	0.008