Town of Chapel Hill
Stormwater Management Program Funding Analysis
Cost of Service, and Rate Analysis

Section 1 - Introduction

1.1 Purpose

This project is intended to identify a program structure for a five-year planning period in support of a change in funding strategy for stormwater through the use of a utility or user-fee based revenue generator. In the summer of 2002, the Town Council authorized the Town Manager to proceed with the development of policy and a program that would be funded through a user-fee supported stormwater management utility. The use of a utility for long-term financing of regulatory and operational needs to support the drainage infrastructure and to comply with water quality mandates and initiatives is occurring throughout the state of North Carolina, with the first major user-fee supported program implemented in the early 1990's in Charlotte.

This report consolidates several products of a thorough analysis of the Town of Chapel Hill's stormwater management needs, strategic options, and funding opportunities. It focuses on the scope of needed stormwater management services and facilities, the magnitude of associated costs, the funding options available to the Town, and the structure of service fees that could be used to support an effective program. A five-year planning period is the basis of the analysis and recommendations on level of service, funding and financing strategies.

This report is drawn from, references, and includes information from, other studies, analyses, and investigations performed by the AMEC consulting team and by the Town over the past decade that involved citizen-based advisory committees. It reflects a process of due diligence that ensures that the Town has accounted for all key considerations in formulating its stormwater management program and crafting a practical and effective funding strategy. It is sufficient to support adoption, by the Town Council, of a municipal stormwater utility rate methodology and service fee rate, acting pursuant to the authority and powers provided in North Carolina statutes and the Town's Charter.

1.2 Compelling Need for a Funding Solution

Inadequate funding has been a major impediment to attaining solutions for the Town's drainage problems and water quality challenges. The stormwater program costs have not been fully captured and clearly delineated in budgets, with program direction divided among various operating departments such as Public Works, Engineering and Planning. Funding has been primarily through appropriations from the Town's General Fund with some support through planning grants. Infrastructure improvement needs have been identified by the Town staff, but have largely gone unmet for lack of consistent funding. Unmet capital needs of $679,000 have been identified by staff. This value will likely grow exponentially upon completion of basin models and Master Plans for watersheds, based on the experience of other communities of similar age and historical growth rates.

Drainage and water quality are long-term, pervasive, community-wide issues that cannot be solved by localized measures or a one-time infusion of funds. We believe there is a compelling need to provide better stormwater management services Town-wide. To do so, the Town must

either increase revenues from current sources or adopt other funding methods to supplement them.

1.3 Process

A solution to the current funding quandary rests first on defining an effective stormwater program and then determining if one or more viable funding methods exist to support it. An iterative process has been employed, including the following steps.

- The general nature of stormwater problems and needs in the Town were evaluated through interviews with staff, review of the past decade of work by staff and citizen committees and by some general field investigations. This work occurred during the development of the Business Plan for Stormwater in 2002 and was expanded during the development of the plan of services for utility financing.

- Numerous meetings and interviews were held with Town staff to assess the current status of stormwater management activities and associated funding, and to identify future needs. Operational, regulatory, infrastructure management and water quality functions were identified that together constitute the framework of a comprehensive approach.

- A Policy Review Committee, composed of Town citizens with varied interests and concerns, was convened. The committee met with the project team nine times to discuss key stormwater management policies for stormwater program development and to address key policies for fee allocation and billing. Cornerstone issues were identified and discussed with the committee. Their policy guidance on the program strategy was incorporated into the analysis contained in this report. Due to the decade of work on defining the needs and program elements for a stormwater program in Chapel Hill, the Policy Review Committee built off the previous efforts rather than “reinvent” that work.

- The general scope of capital improvement needs is limited due to the lack of Master Plans and supporting basin models that should drive the Capital Improvement Program for the Town. Capital improvements have been identified by staff from complaints received from citizens and from their knowledge of long-standing problem areas within the Town. Addressing the current backlog of capital projects is estimated to cost $679,000.

- Program components appropriate to the problems and needs were identified, and a strategy was developed for growing an effective program. The key components include operations and maintenance, regulation and enforcement, engineering and master planning, capital improvements, water quality, administration and finance.

- Nearly a dozen funding mechanisms and revenue sources were evaluated in the initial phase of work completed in 2002 and summarized in the Business Plan presented to the Town Council in the summer of 2002. At that time the various methods were screened for suitability, including various taxes, service fees, and other funding mechanisms.

- Databases and data processing resources were evaluated to determine their usefulness in implementing various stormwater funding mechanisms and a recommended strategy was presented to the Town for consideration. These included use of the Orange County Water and Sewer Authority billing system, Orange County Tax billing system, third-party billing systems and internal billing capabilities.

1.4 Contents

In addition to this introductory section, the report contains the following.

- Activation of service fees requires a ***Rate Structure Analysis***, which identifies and evaluates methods of apportioning the cost of services and facilities. Five basic rate concepts were examined, seven modifying factors that might be used to fine-tune the basic rate concepts were identified, and ways of orchestrating the service fee rates and other funding mechanisms were evaluated. A preferred rate parameter, impervious area, is recommended. Appropriate rate modifiers and other funding mechanisms are also proposed.

- The ***Cost of Service Analysis*** section projects the estimated operating, non-operating, and capital expenses of the proposed program strategy. Costs are projected for the five-year analysis period. Significant enhancements in the operational program and several remedial capital projects can be accomplished in that period. However, it should be stressed that the stormwater program is expected to extend indefinitely to ensure that the Town's drainage systems are improved, maintained, and operated properly and that water quality is protected.

- The ***Rate Study*** section describes the rate base available to support stormwater management through service fees in Chapel Hill, and presents pro forma cash flow analyses for the planning analysis period.

1.5 Uncertainties Impacting this Analysis

This report presents a reasonable, order-of-magnitude projection of the costs and service fee rates needed to meet both operational needs and capital expenditures during the first five years of a comprehensive program. However, it should be stressed that uncertainties exist that may impact this analysis and the success of the proposed strategy, including the following.

- The Town's NPDES Phase II permit will be issued for a five-year period at some future date, yet unknown at the time of this study. Final rules could impact the program structure as projected within the analysis.

- The NPDES permit is subject to review and renewal in five years, perhaps near the end of the analysis period. The conditions of the renewed NPDES permit could significantly influence costs.

- Blending of several funding sources has become more common in recent years. The opportunity to use other funding mechanisms may alter the costs to be recovered through service fees. For example, the Town Council might decide to adopt service fees and/or might opt to use bonding for infrastructure projects rather than a pay-as-you-go approach. The funding projected for Capital Projects can support the payment of bonded debt rather than cash-fund improvement projects.

- Significant informational gaps exist. For example, the Town has a known backlog of approximately $679,000 in capital project needs. It is recommended that an aggressive strategy be followed in completing Master Plans on the major watersheds with sub-basin models and plans completed toward the end of the analysis period. These will add to the list of needs. Master plans should address not only systems where hydraulic capacity needs are known or are a priority but should address water quality protection initiatives

so that a comprehensive prioritization process can be developed to support all community objectives.

- Our experience elsewhere suggests that capitalization of smaller systems could involve substantial costs. The development community may bear some of that expense as they build new subdivisions and commercial projects, but the amount is uncertain. It is important that upon completion of the major watershed studies that sub-basin analysis occur to assist in objective development review and strategies for the Town.

- The Town's role in stormwater management is likely to broaden, may extend into different functions and responsibilities, and may include elements of the natural drainage systems that are not presently subject to Town control, management, and operation. It is exceedingly difficult to manage an extensive physical "system" by dealing with only a portion of the components, which suggests that the Town may choose to expand the systemic extent of the drainage facilities it actively manages.

- Annexations of unincorporated areas may occur, which could alter priorities and increase the capital and operating needs and costs.

- Routine maintenance and remedial repair needs increase as drainage systems age, but the age profile and rate of deterioration of the existing drainage infrastructure in Chapel Hill is not fully known at this time. Thus, increases in operational workload can only be estimated based on our experience in similar settings. Watershed Master Planning should address analysis of current system conditions as part of the prioritization strategy for capital improvements. Inventory of the drainage infrastructure should include data on structural condition, material type, and date of construction.

- Federal and state regulatory requirements will likely increase, especially those associated with water quality. Total Maximum Daily Load (TMDL) limitations on discharges to receiving waters could impose even more demanding and costly stormwater management responsibilities and practices on the Town than the current proposed NPDES permit. Revised floodplain mapping and federal regulations may impact the Town's drainage infrastructure capitalization and operating needs. For example, the Federal Emergency Management Agency has recently mandated that local and state hazard mitigation plans be adopted in order to be qualified for hazard mitigation funds in pre- and post-disaster situations. It is implied that adoption will result in the funding and implementation of hazard mitigation strategies within the Plan for each community.

- The visibility of stormwater management and the community's service expectations are likely to increase if the Town Council adopts the recommended funding service fee. Higher service levels almost always result in higher costs.

In light of these uncertainties, the program strategy, cost and rate projections in this report could be subject to change as additional information is gathered and processed and the Town Council makes key policy decisions. If the Town Council decides to proceed with establishing a user-fee ordinance, further refinement of the program strategy, priorities, funding mechanisms, costs, and rates will follow from time to time as the program evolves. A routine program and rate review is recommended to ensure that the stormwater program maintains sufficient, adequate and stable funding.

1.6 The Character and Scope of Stormwater Management

The Town of Chapel Hill staff and Town Council have recognized for several years that its stormwater management capability is not sufficient to correct existing drainage problems or prevent future ones from developing. However, the many dimensions and magnitude of the challenges of managing stormwater may not be fully grasped by the community at-large.

Booker Creek

- The threat of flooding is a primary dimension of stormwater management. Most people think of drainage service in those terms. The general perception in Chapel Hill appears to be that the impacts of flooding are localized, neighborhood concerns. Thunderstorms create neighborhood flooding and erosion along streams, ditches and channels. Some may even pose personal safety hazards to citizens or property when streams surge out of their primary channels and flood homes, yards, and roads.

- Federal floodplain management and water quality mandates comprise a second dimension of the stormwater management challenge. The Town operates in an environment dictated in part by the requirements and restrictions contained in federal and state laws, which may prevail over local customs or priorities. They principally impact the Town's land use regulations, development standards, and operational activities. Some things the Town must do are not based on service demands initiated by local citizens and businesses, and may even be resisted by some.

- The aging of the existing stormwater infrastructure is a key third dimension of the challenge facing Chapel Hill. The on-going infrastructure management aspect of stormwater management may be misunderstood and underestimated. Chapel Hill contains several small watersheds where drainage is provided by natural streams, ditches, and improved channel systems that are visible to the general public but not necessarily perceived as "public systems". The remainder of the drainage system is out-of-sight in underground storm sewers, inlets, and other structures. Much of the infrastructure was installed fifty years ago or more, and is approaching the end of its useful physical life. Experiences in other communities indicate that the failure rate of storm sewers, inlets, and other drainage infrastructure increases markedly when structural components reach two-thirds to three-quarters of their useful lives. Given the pattern of development and age profile of the Town's infrastructure generally, it is likely that a substantial portion of the drainage systems will need remedial repair (if not replacement) in the next two decades.

1.7 "Building Block" Program Development Approach

This analysis is predicated on a program development strategy that emerged from the consultant's investigations, with input from the Town staff and the Policy Review Committee. Stormwater management has become a complex municipal business that requires sophisticated engineering, diverse operational functions, and a substantial investment in infrastructure. A "building block" approach is recommended by the consultant team as the most practical way to upgrade the current stormwater management efforts over time.

The recommended strategy is intended to implement a comprehensive, long-range program in a series of logical steps that:

- optimize the balance of investment in capital facilities,
- address replacement of aging systems,
- provide for maintenance of existing infrastructure,
- include regulation of private development impacts on stormwater runoff and the drainage systems, and
- balance water quality functions with flood protection and erosion control.

Establishing adequate and equitable funding is an immediate priority in the strategy. Concurrently, the Town should expedite attainment of visible improvements in day-to-day service levels and construction of infrastructure so the community sees results. Improved routine maintenance and remedial repair of aging systems are key objectives to address citizen needs. Public information is vitally important in educating the community about stormwater management.

The building block approach also addresses activities that go on behind the scenes. An inventory of the major drainage systems has been assembled in support of the master planning analysis. This is a valuable resource and has potential applications to maintenance and regulatory programs as well as capital project planning and construction. For example, pursuant to its NPDES permit, the Town must identify and periodically inspect all significant stormwater discharge points. A system inventory provides a framework for such information. Assembly of the physical inventory points out a gap in the Town's support resources. The current inventory should include condition of the structures, age and material type.

A comparable "access inventory" is also needed which identifies existing easements, rights-of-way, rights-of-entry and other access provisions. Such rights enable (or limit) the Town's ability to build, maintain, operate, and regulate the drainage systems. An access inventory integrated with the system inventory would provide improved command and control of operational activities and support for design and construction.

Additional support systems and resources are needed. For example, a geographical information system (GIS) can be a powerful tool in both assembling and applying data to the day-to-day program. Investment in maintaining and enhancing such support systems will pay off for years to come in the form of more effective, less costly operations and maintenance and fewer problems during and following storm events. Integration of existing data into a work-order management system in Public Works, coordinated with a customer service tracking database, all linked to the GIS platform, will be a powerful tool for efficiently managing existing conditions and in planning for and anticipating potential system failures.

The proposed strategy recognizes that the scope of the Town's program must be broadened if the existing problems are to be addressed and future ones avoided. It also emphasizes the importance of properly orchestrating the assembly of the program "building blocks" into a cohesive, understandable package. The timing of various program elements is carefully considered in projecting the costs of service. The investment in planning is an emphasis of the first five-years that will result in a growth in capital projects and an increase in remedial repairs. Chapel Hill's ability to optimize its routine maintenance, remedial repair and replacement, water quality, and capital improvement programs will be constrained by the need to finalize plans, so that must be expedited to support effective services to the community.

External influences are also accounted for in the building block approach. The Town's stormwater management responsibilities are now defined in part by the federal Clean Water Act[1] and its NPDES permit. In addition, on-going discussions in Total Daily Maximum Load studies for resources such as Jordan Lake, will likely impact the business of stormwater management. The Town does not have an option in regard to the NPDES permit nor imposed TMDL discharge limits, if and when established. It must comply in a timely manner or face possible sanctions, even including the potential loss of federal funds for transportation and other programs and substantial fines by federal and/or state agencies for non-compliance. The program strategy and cost analysis recognize this mandate and provide for greater emphasis on stormwater quality through compliance with the permit, enhanced monitoring, and community outreach.

1.8 Program Development Priorities

The type and amount of stormwater management costs projected in this report are driven by the work program priorities of the five-year analysis period. Priorities were frequently reviewed and discussed with the Town staff and the Policy Review Committee as strategic options were being crafted. Three different citizen-based committees studied the issues of stormwater in the Town from 1992 to 2002. The priorities established by these various committees were presented to the Policy Review Committee over the past year. The Committee was charged with validating those previously identified issues of concern and clarifying the priorities. The Committee identified the following priorities.

1.8.1. *Develop and implement a comprehensive Stormwater Program Master Plan that supports all of the stormwater program priorities.*

A Stormwater Program Master Plan will be developed based on the Mission and Program Priorities. The work reflected in this report is the initial basis of the Program Master Plan and implementation. A time-line and schedule are identified with the resources needed to accomplish the major program priorities identified in paragraphs 1.8.2 through 1.8.10. The Stormwater Master Plan will include the development of standards of system performance and watershed planning and will begin in the first year of program implementation.

1.8.2. *Address stormwater quantity (flooding) as an integral component within the program.*

The stormwater management program will be enhanced to include comprehensive long-range management efforts to minimize flood risks and the many effects of flooding. The Watershed Master Plans including basin models and sub-basin analysis are the key components for integration of infrastructure demands in on-going remedial and replacement programs. The Master Plans for watershed will help in prioritizing and addressing stormwater infrastructure needs such as maintenance, repair, replacement, upgrades and capital improvements.

1.8.3. *Address stormwater quality as an integral function within the program.*

The stormwater management program will continue to address stormwater *quality.* This applies to water quality regulatory demands, erosion and sediment controls, and stream and aquatic system health. The stormwater management program will recognize and move toward the goals of the Town's Year 2000 Comprehensive Plan.

[1] Public Law 92-500, The Clean Water Act, as amended by the 1987 Water Quality Act.

1.8.4. *Protect and restore natural stream corridors.*

The health of the aquatic ecosystem is dependent on both quality and quantity management. The Town's stormwater management program will address both infrastructure concerns and aquatic habitat health.

1.8.5. *Develop a formal public education and involvement program.*

Stormwater education efforts will identify key stakeholders, including institutions, development and business communities, and the general public. Education efforts will focus on both causes and solutions for stormwater problems, including possible regulatory remedies. The goal will be to establish a clear understanding that stormwater and surface water systems are a public resource to be protected and managed in the public interest.

1.8.6. *Define the level of service and performance standards for the Town's Stormwater Program.*

Through the watershed Master Planning process, the stormwater management program will plan, prioritize, design and construct system improvements at a pre-determined level-of-service that is considered to be appropriate for public and private drainage systems. Defining the level and extent of service and performance for the Town's drainage system provides valuable guidance about how and where stormwater management is to be delivered and enforced.

1.8.7. *Ensure compliance with Federal and State regulatory mandates.*

The stormwater management program will implement reasonable regulatory programs that comply with stormwater quality mandates from Federal and State, agencies, and will address floodplain management requirements.

1.8.8. *Establish clear stormwater program leadership that the public recognizes.*

The stormwater management program will clearly identify point(s) of contact responsible for system planning, regulatory compliance and enforcement, system design, construction and maintenance, and addressing stormwater concerns from the public. This information will be publicized through the public education and outreach efforts so that communication with the Town staff and leadership is effective and provides feedback to citizens.

1.8.9. *Integrate programs to utilize resources efficiently.*

The stormwater management program will minimize duplication and inefficiencies in the management and implementation of the various stormwater elements in order to improve the overall cost-effectiveness of the program and to optimize the use of already scarce resources. It will promote integrated programs and inter-jurisdictional cooperation aimed at ensuring a positive public reception of the program. It will utilize technology appropriately to increase communication and understanding of priorities and program objectives internally and externally to the Town organization.

1.8.10. *Establish an understanding of the stormwater system as a "utility".*

The stormwater infrastructure is a significant investment made by private and public interests. It is composed of man-made and natural elements. It functions similar to the water and sewer system except that it is open to natural influences. It is important that the community understand the operation and management of this system as a "utility" and funding the program through user-fees that are linked directly to demand for service will increase the support for addressing the challenges the Town must face. The creation of a utility, providing a stable, dedicated funding source like those already in place for other services (i.e. water, sewer, gas, electricity) will reinforce this message.

1.9. Conclusion

Resources will be dedicated on a consistent basis allowing for long-range planning and program implementation with certainty of service delivery. This provides the staff with the ability to define goals that will drive programs implemented over several budget cycles with assurance that the program can be effectively and efficiently delivered to the public, to meet their needs and expectations.

It is estimated that a fully preventive level of routine maintenance will require at least five to eight years to achieve, and perhaps a decade or more. The current backlog of remedial repairs is not fully known and, when combined with those that will emerge as the drainage systems continue to age, could require ten years or more to resolve. It should be anticipated that the backlog of needs may increase significantly when the systems are fully examined and capital improvement master plans are finalized. Simply extrapolating from the experiences of similar cities, it is not unrealistic to think that the backlog of remedial needs alone might approach several million dollars.

Section 2 – Planned Program

2.1 Purpose

Upon completion of the prioritization of program initiatives through the Policy Review Committee input and staff input, the Consultant Team's challenge is to create a program of services, utilizing the current program of services as the baseline and evaluating gaps in service or deficiencies in resources, which will create outcomes addressing the program priorities. A five-year planning horizon is utilized. This planning period provides sufficient time to define program content and evaluate resources that are predictable and understandable, limiting the need to quality conditions and unknowns. As the program matures in meeting current priorities and objectives, the planning horizon can expand, as we have seen in the water and sewer industry, which now uses planning horizons of 25 to 50 years.

In this section, the program of services will be defined using the program categories of Engineering and Master Planning, Operations and Maintenance, Regulation and Enforcement, Stormwater Quality, Administration and Finance and Capital Improvements. In the development of the program, a building-block approach was followed, identifying linkages between program elements and coordinating an increase or decrease in resources in one program area to potential impacts for another program area. For example, the schedule for increasing monitoring resources under Stormwater Quality programs is clearly linked to implementation of watershed basin modeling under Engineering and Master Planning for the provision of data into the basin models on stream flows and water quality conditions. The Consultant Team understands the importance of coordination of those program elements, so that the program recommended is consistent in outcomes and does not fluctuate wildly in the need for resources or staff, making it difficult to manage within the overall program of services.

2.2 Stormwater Program Organizational Options

During the evaluation of the program of services, consideration is given to the organizational options available to the Town in carrying out the initiatives. It is recommended that overall programmatic leadership remain with the Engineering Department, with the Stormwater Program assigned to a Manager who will be accountable to the City Engineer and who will coordinate the work effort for all units that carry out elements within the overall program of services. It is not recommended that a major reorganization occur but that clear and direct accountability be established for the management of resources and program on behalf of the Town Council and the community. Utilization of technology to enhance program implementation is an effective technique used in many stormwater programs. Providing additional technology in Public Works and Engineering is included in the program recommendations. This technology will provide data tracking capability on customer service, work orders, work accomplished and cost of service.

The stormwater enterprise fund will serve to provide resources to organizational elements accounted for in their "home account" such as the General Fund, utilizing internal accounting procedures to provide revenue contributions to those units. It is recommended that two individual positions be moved from their current "home account" to the stormwater enterprise fund. New positions recommended to address expanded or new services would be added, upon approval of the Town Council, to the appropriate organizational unit, but funded through stormwater fees.

2.3 Stormwater Program

The initial development of an enhanced program of services was driven by the input and recommendations from the Policy Review Committee. The five year program is described below. Upon completion of this work, refinement of the program was completed with input from the Town Council, the Town Manager, and Town staff. A cost model was developed and is described in Section 4 for the initial program developed based on input from all sources. The program evolved over a four month period of review by the Town staff and the Consultant Team with key input from the Town Council and leadership. The final program addresses internal policies for financial accounting and the ability of the Town staff to absorb an increased workload of managing the new utility while initiating additional projects. The first year of the recommended program is focused on planning, compliance with Federal and State water quality regulations and maintaining current programs and projects.

2.3.1 Recommended Program of Services

On January 26, February 16, March 29 and April 28, 2004, the Town Council met with the staff, the Consultant Team and the Policy Review Committee, during schedule public meetings to discuss the issues, provide input and give policy direction for the refinement of the program and rate policy. Direction was given to use Year One of the enhanced program to initiate the Master Planning process, comply with NDPES requirements, create reserves for establishing a capital improvement program and to limit enhancements in other program areas to those necessary for existing staff to meet new work initiatives while maintaining services to the community.

In addition, direction was provided by staff and the Town Manager on key internal policies regarding fund balance requirements, indirect cost allocations and other critical financial and personnel polices that must be met within the resources of the enterprise fund management structure. These include:

- Payback of the investment made by the Town to establish the stormwater utility user-fee and enterprise fund.
- Maintenance of a 10 percent fund balance as an on-going operating reserve.
- Establishment of an emergency reserve for catastrophic infrastructure failure at a rate of $50,000 a year.
- Limit additional new staff to two positions in the Stormwater section, a staff engineer for support of development services and an education specialist for compliance with the NPDES permit
- Increase fee by 10 percent annually until full program is developed and operational to meet the priorities and objectives developed with the Policy Review Committee.

Incorporation of these objectives, along with the program focus for Year 1, resulted in the following recommended program of services.

Engineering, Modeling and Planning
Recommended Program

Year One	Year Two	Year Three	Year Four	Year Five
1. Initiate Master Plan that support all program priorities.	1. Continue Master Plan process to address major watersheds	1. Complete Master Plans on major watersheds.	1. Initiate sub-basin planning based on priorities identified through major basin plans, if appropriate.	1. Continue watershed master plan process at the sub-basin level as needed.
2. Maintain current services. - floodplain mgmt. - FICRS - Technical assistance to public - Mapping/GIS - Development services	2. Maintain current services. - floodplain mgmt. - FICRS - Technical assistance to public - Mapping/GIS - Development services	2. Maintain current services. - floodplain mgmt. - FICRS - Technical assistance to public - Mapping/GIS - Development services	2. Maintain current services. - floodplain mgmt. - FICRS - Technical assistance to public - Mapping/GIS - Development services	2. Maintain current services. - floodplain mgmt. - FICRS - Technical assistance to public - Mapping/GIS - Development services
3. Address increasing workload for review of plans, site inspections, and technical assistance through staff addition.	3. Initiate Capital Improvement Program process, establishing criteria for prioritization of projects, while creating a financial reserve.	3. Complete creation Capital Improvement Program based on master plans of major watersheds.	3. Expand support for Public Works maintenance and remedial repair, shifting efforts to a more proactive program based on studies.	3. Continue design and construction of capital improvement program.
4. Create technology tools to coordinate database mgmt. with Public Works maintenance and remedial repair program.	4. Review existing standards for system performance and update as appropriate to meet NPDES permit.	4. Initiate design of capital improvement projects and contract for construction of major improvements	4. Update technology tools, as needed, including basin models for decision making and capital improvement program support.	4. Maintain and calibrate basin models to provide decision tools for development and capital improvement program support.
	5. Install rain and stream gauges as necessary to support Master Planning process for basin studies.	5. Adjust data gathering to address Watershed Master Plan process.	5. Continue design and construction of capital improvement program.	

Operations and Maintenance
Recommended Program

Year One	Year Two	Year Three	Year Four	Year Five
1. Maintain current maintenance capabilities in Public Works Street Division.	1. Expand maintenance manpower capability for catch basin cleaning and remedial repair.	1. Sustain maintenance capability established in Year 1 and Year 2.	1. Sustain maintenance capability established in Year 1 and Year 2.	1. Sustain maintenance capability established in Years 1, 2 and 4.
2. Add technology tools for work-order management and coordinate with GIS system and Engineering database tools.	2. Increase use of technology by addition of equipment for inspection of closed pipe system.	2. Evaluate maintenance needs based on input from Master Plans and basin models.	2. Increase, if required, maintenance resources based on outcomes of Master Plans and basin models.	
3. Integrate customer service request tracking into technology enhancements (Item 2).	3. Increase capability for cleaning system through addition of equipment in field.			
	4. Maintain current maintenance capabilities in Public Works Streets Division for on-going services.			

Regulation and Enforcement
Recommended Program

Year One	Year Two	Year Three	Year Four	Year Five
1. Maintain on-going services in Inspections and Code Enforcement.	1. Maintain on-going services in Inspections and Code Enforcement.	1. Maintain on-going services in Inspection and Code Enforcement	1. Maintain on-going services in Inspection and Code Enforcement	1. Maintain on-going services in Inspection and Code Enforcement
2. Maintain on-going support for floodplain management.	2. Increase capability for follow up and enforcement, as needed, for illicit discharge detection program.	2. Oversee compliance with NPDES Permit standards and take appropriate enforcement actions.	2. Oversee compliance with NPDES Permit standards and take appropriate enforcement actions.	2. Oversee compliance with NPDES Permit standards and take appropriate enforcement actions.
3. Respond to NPDES permit mandates as appropriate.	3. Increase capability to coordinate erosion and sediment regulation, inspections and enforcement.	3. Increase inspections of structural controls and water quality system controls.	3. Maintain inspections of structural controls and water quality system controls.	3. Maintain inspections of structural controls and water quality system controls.
	4. Update current ordinances and standards as needed to address NDPES Permit requirements.			4. Renew NPDES Permit and update regulatory standards and ordinances as appropriate.

Stormwater Quality
Recommended Program

Year One	Year Two	Year Three	Year Four	Year Five
1. Maintain on-going services to address water quality regulations, field services, inspections.	1. Maintain on-going services to address water quality regulations, field services, inspections.	1. Maintain on-going services to address water quality regulations, field services, inspections.	1. Maintain on-going services to address water quality regulations, field services, inspections.	1. Maintain on-going services to address water quality regulations, field services, and inspections.
2. Increase staff capability to address NPDES permit requirements for Public Education and Outreach.	2. Increase staff resource to address NPDES permit compliance, including illicit discharge program, water quality monitoring, good housekeeping, industrial permit compliance.	2. Maintain compliance with NPDES permit.	2. Maintain compliance with NPDES permit conditions.	2. Maintain compliance with NPDES permit conditions. - PE - Illicit Discharge Program - Post Construction Program - Construction Program
3. Expand current WebPages as a key resources for public outreach.	3. Inspect Best Management Practices for water quality.	3. Update standards on BMPs for water quality protection.	3. Expand Stream restoration projects as Master Plans are completed.	3. Renew NPDES permit.
4 Continue regional participation in TMDL discussion on Jordan Lake.	4. Test pilot BMPs and monitor.	4. Expand Stream restoration projects as Master Plans are completed.	4. Maintain monitoring program.	4. Expand Stream restoration projects as Master Plans are completed.
	5. Maintain and update database on habitat and stream assessment.	5. Maintain monitoring program.		
	6. Initiate stream restoration project as Master Plans are completed.			

Capital Improvements
Recommended Program

Year One	Year Two	Year Three	Year Four	Year Five
1. Create reserve for capital improvements.	1. Complete one stream restoration project based on initial input from watershed Master Plans.	1. Complete one stream restoration project based on input from watershed Master Plans.	1. Increase staff resources to address growth in capital improvements program, field services, data analysis.	1. Complete one stream restoration project based on input from watershed Master Plans.
	2. Take corrective action to address 2 priority remedial repairs to the drainage system based on current backlog of needs.	2. Take corrective action to address 4 priority remedial repairs to the drainage system based on current backlog of needs.	2. Complete one stream restoration project based on input from Master Plan process.	2. CIP program established based on Master Plans.
	3. Acquire or set aside resources to acquire land for conservation, open space, or stream buffer.	3. Acquire or set aside resources to acquire land for conservation, open space, easements, or stream buffers.	3. CIP program established based on Master Plans.	3. Acquire or set aside resources to acquire land for conservation, open space, or stream buffer protection.

Administration and Finance
Recommended Program

Year One	Year Two	Year Three	Year Four	Year Five
1. Oversee implementation of utility operation including staffing, space allocations, billing procedures, and equipment purchases.	1. Oversee utility operation including staffing, space allocations, billing procedures, and equipment purchases.	1. Oversee utility operation including staffing, space allocations, billing procedures, and equipment purchases.	1. Oversee utility operation including staffing, space allocations, billing procedures, and equipment purchases.	1. Oversee utility operation including staffing, space allocations, billing procedures, and equipment purchases.
2. Establish credit program.	2. Maintain credit program.	2. Maintain credit program.	2. Maintain credit program.	2. Maintain credit program.
3. Coordinate with external agencies and organization and with internal organizations to ensure effective service delivery to community.	3. Coordinate with external agencies and organization and with internal organizations to ensure effective service delivery to community.	3. Coordinate with external agencies and organization and with internal organizations to ensure effective service delivery to community.	3. Coordinate with external agencies and organization and with internal organizations to ensure effective service delivery to community.	3. Coordinate with external agencies and organization and with internal organizations to ensure effective service delivery to community.
4. Maintain on-going general communications and education program with community.	4. Maintain on-going general communications and education program with community.	4. Maintain on-going general communications and education program with community.	4. Maintain on-going general communications and education program with community.	4. Maintain on-going general communications and education program with community.
5. Provide staff support for the Citizen Advisory Board.	5. Provide staff support for the Citizen Advisory Board.	5. Provide staff support for the Citizen Advisory Board.	5. Provide staff support for the Citizen Advisory Board.	5. Provide staff support for the Citizen Advisory Board.
6. Repay General Fund for resources utilized to create stormwater program and funding mechanism.		6. Complete rate evaluation and program update based on completion of Master Plans for watershed improvements.		6. Complete rate evaluation and program update based on completion of sub-basin plans and NDPES permit negotiations.

This program of services is the recommended strategy to begin the steps to achieve the goals and objectives embodied in the priorities identified in Section 1. The resources necessary to achieve these program initiatives are outlined in detail in Section 4. A summary of those resources is provided in the following Table. In Year 1, the payment to the General Fund for the investment of resources to create the stormwater program and utility is $402,000. These numbers include resources to address financial policy objectives such as reserves and bad debt management.

Year	Resource Need
2004-2005	$1,743,417
2005-2006	$1,957,405
2006-2007	$2,208,312
2007-2008	$2,344,926
2008-2009	$2,433,566

Section 3 - Rate Structure Analysis

3.1 Purpose

Several ways of structuring and calculating stormwater service fees (or “user charges”) are employed by cities and counties throughout the United States. This section of the report summarizes several rate methodology options available to Chapel Hill. The basic parameters employed for rate structures, plus modifying factors that can be applied to the various methodologies, are described. Other funding methods that can be blended with fees are identified.

The initially preferred rate structure and mix of funding may have to be adjusted as needs change over time. Information will flow from the future watershed master planning that may suggest that substantial capital investment is needed in the drainage systems. More remedial repair and capital improvement needs may be identified as the master plan is implemented and existing systems continue to age. Stormwater quality management may become an even more demanding part of the program as the Town’s NPDES permit is implemented and renewed. Fortunately, the stormwater utility approach provides excellent flexibility to adjust as the needs evolve, including allowing changes in the program, funding demands, and rate concepts.

3.2 Evaluation Criteria

The consultant team’s experiences implementing a variety of stormwater funding methods elsewhere suggest that the most important factors in selecting a practical approach are the local circumstances, practices, and politics. Every community is different and needs a solution that fits its specific situation. Beyond circumstances unique to Chapel Hill or the North Carolina Statutes, the following criteria were applied during the development of the Business Plan and during implementation discussions for the utility:

- attainment of equity in the apportionment of costs;
- the balance of rates with level of service;
- data requirements to support cost allocation methods;
- cost of implementation and upkeep;
- compatibility with existing data processing systems;
- consistency with other local financing and rate policies;
- financial sufficiency;
- revenue stability and sensitivity; and
- flexibility.

None of the service charge rate structures or secondary funding methods examined during the preparation of the Business Plan or the final policy development for the utility is "perfect" under such a broad range of criteria. The listed order of the criteria above does not imply a priority, and no single consideration should outweigh the others to the extent that a rate methodology or secondary funding method is selected or rejected for any one reason.

3.3 Framework of Rate Structure Components

The stormwater rate methodologies, rate modifiers, and other funding methods identified in this report provide a menu of options to the Town. Basic rate structure concepts are the foundation of a service fee. Modifying factors (such as how rate decisions will impact single-family residences and use of base rates for fixed costs per account) enable a basic rate methodology to be fine-tuned. Also, several other funding methods can be used in coordination with a

service fee rate methodology to optimize funding for the entire program, such as grants and loans. The relationship between service fee rates and the cost of providing services and facilities should be evident in the rate design.

3.4 Service Fee Rate Structure Options

The proposed program strategy is designed to address the problems that result from increased volumes and rates of runoff and pollution of receiving waters. Thus, the costs incurred by the Town in providing the program services can be traced back to the cumulative impacts of many individual properties. The various parameters and calculation methodologies commonly used in stormwater management rate structures are intended to quantify the relationship between conditions on individual properties and the demands they impose on the municipal stormwater program and systems. Many factors influence the amount, peak rate, and pollution loading of stormwater runoff from properties, ranging from the nature of the land surfaces to vegetation and soil characteristics.

Five rate structure options are examined in this report. After review, we have concluded that two are better suited than the others for use in Chapel Hill and were included in the initial recommendation for implementation of the utility. Seven modification factors are also examined. Several secondary funding methods are also integrated in the funding strategy.

Similar rate structures and associated funding concepts are used in more than five hundred other communities across the United States that have established stormwater management utilities, districts, and similar entities. Direct comparisons with rate methodologies, modifications, and secondary funding methods used elsewhere are not appropriate, however, since the approaches examined in this study must be viewed in the specific context of the needs, priorities, and local circumstances in Chapel Hill.

Examples of service fees resulting from various rate methodologies are provided in this report. They compare charges to typical residential and non-residential properties under different methodologies, but are only illustrative. The example fees are only generally representative and typical of what has occurred elsewhere when the various rate methodologies have been applied. They clarify how cost apportionment is influenced by the rate structures. The actual charges to residential and non-residential properties in Chapel Hill might differ from the example values cited in this report, depending on the revenue requirement of the program and the design of the rate methodology. The figures cited in the examples should not be viewed as specific values that would result from the selection of any of the rate options in Chapel Hill.

The basic rate methodologies examined were:

- impervious area;
- impervious area and the percentage of imperviousness;
- a combination of impervious area and gross area;
- gross property area and the intensity of development; and,
- gross area and several modifying factors.

Modifying factors could be used to alter the basic rate methodologies, including the following:

- a simplified single-family residential rate;
- a tiered rate for single-family residential with a cap on the billing units
- a base rate for certain fixed costs of service;
- watershed or other surcharges for localized costs;

- service charge credits;
- a water quality impact factor;
- a development and land use factor; and,
- a level of service factor.

In addition to utility service charges, eight other funding methods or sources of funding were examined during the development of the Business Plan in 2002. Most would be used only in special situations or be applied to limited clientele groups. For example, the Town Council might wish to institute special service charges for stormwater-related services not generally provided to all properties or for limited geographical areas that receive higher than standard levels of service. Secondary funding methods or sources previously evaluated were:

- General Fund appropriations
- Special assessments
- Bonding for capital improvements
- In-lieu of construction fees
- System development charges
- Impact fees
- Developer extension/latecomer fees
- Federal and state funding opportunities

Except for General Fund appropriations and bonding for infrastructure capitalization, these supplementary funding methods would generate only a minor portion of the total funding that is needed to support the proposed program. The primary purposes of most would be to enhance equity, improve public acceptance of the utility concept, and expedite special components of the stormwater management program. Several of these could be incorporated directly into a service charge rate structure rather than established separately. Once Master Plans are completed, the Town will have sufficient data to make decisions about implementing these supplemental funding sources.

3.5 Basic Rate Methodologies

3.5.1 Impervious Area Rate Methodology

Stormwater rate methodologies based solely on impervious area have been widely used. They are simple, easily understood by the general public, and impervious area data is relatively inexpensive to measure or obtain. The perceived equity of an impervious area rate methodology is high. Most people understand the hydrologic impact of covering natural ground with paving and rooftops. Large expanses of roofs and paving in shopping centers and other commercial and industrial business areas are highly visible.

Numerous technical studies, references, and citations in engineering literature technically validate the general perception of the equity of an impervious area rate methodology. The coefficient of runoff decimal value in hydrologic engineering tables closely approximates the percentage of impervious cover. Empirical evidence gathered in the field by monitoring changes in peak runoff before and after development verifies that impervious coverage is the key factor influencing peak stormwater runoff. Stormwater quality data gathered during the National Urban Runoff Program (NURP) and subsequent research also indicate that impervious area is the single most dominant factor in pollutant loadings in stormwater.

Many impervious area rate structures include simplified single-family residential service fees, often as flat-rate charges applied to all such properties. Charges to non-residential properties may be structured in a variety of ways under an impervious area methodology. In some cases

the average amount of impervious area on single-family residential properties is used as an "equivalent unit" value for determining service charges to non-residential properties. In other instances 1000 square foot ranges of impervious area are used. These are commonly referred to as "range" values.

Service fees are usually calculated by dividing the amount of impervious area on each parcel by the equivalent unit value or the range value and multiplying the product times a charge per unit. Very few stormwater service fee rate algorithms use the exact amount of impervious area on each property because the accuracy of the impervious area data typically available does not support such a precise calculation. Comparing charges to dissimilar properties is easy when an equivalent unit value is used.

An impervious area service fee rate methodology introduces a potential "timing" problem in the allocation of the cost of capital improvements because the service fees would be applicable only to developed properties. Stormwater capital improvements are typically designed to accommodate future growth by over-sizing systems relative to current conditions and needs. Other funding mechanisms, such as system development charges, can be used in concert with an impervious area rate methodology to ensure that undeveloped properties ultimately participate equitably in the cost of capital improvements designed to serve them. Additional administrative systems would be needed to support a system development charge.

The data requirements associated with implementing and maintaining a stormwater service fee depend more on the subtleties of the rate methodology and the use of modifying factors than on the basic parameters selected. For example, if an impervious area method were to be applied to all properties individually, the Town would have to generate impervious area information for residential as well as non-residential parcels. However, if a simplified residential service fee is utilized, data requirements and costs might be reduced by as much as seventy (70) percent for long-term maintenance of data regardless of the type of rate methodology employed. A two-tier or three-tier simplified rate structure for residences similar to those used in Cincinnati, Ohio, Charlotte, North Carolina, Boulder, Colorado, and Tacoma, Washington requires maintenance of impervious data on all the residential housing stock as well as non-single family residential properties.

The cost of implementing an impervious area rate structure is a function of the number of properties that must be measured, the accuracy standards adopted for data, and the measurement technique employed. Accuracy standards influence the cost of both initial implementation and subsequent data maintenance. The compatibility of an impervious area rate methodology with the Town's existing data processing systems would appear to present few problems. The issue of how to bill for stormwater management is yet to be fully resolved but the consultant team and staff considered use of the OWASA billing system as well as Orange County tax bills as primary methods. It is recommended that the Orange County Tax bill mechanism be utilized due to compatibility with the Master Account File setup for stormwater management and for efficiency in delivery of the bill.

An impervious area rate methodology is highly stable and insensitive to property alterations by ratepayers for the purpose of reducing service fees. Reductions in impervious coverage are rarely justified merely to reduce stormwater fees. Alterations to properties that would reduce stormwater fees are essentially infeasible under all the rate structure options examined in this study.

The rate of revenue growth using an impervious area methodology would more or less correspond to the pace of development. Economic downturns would tend to diminish the

addition of new impervious area to the rate base and thus the stormwater revenue growth under this methodology.

An impervious area rate methodology is not as flexible as some other options. It is based on a single parameter that can be accurately measured. The primary means of introducing flexibility into an impervious area methodology is through modifying factors and by allocating certain costs to other rate mechanisms or funding methods. Approaches based on subjective parameters like intensity of development (which is often coupled with gross area) allow substantially more engineering judgment to be applied, both in the design of the rate methodology and in its application to specific properties. An impervious area rate structure can accommodate other funding methods based on the same parameter, such as system development charges applied to new developments to recover deferred participation in capital investment costs.

3.5.2 Impervious Area and Percentage of Impervious Coverage

Under this methodology the amount of impervious area and the impervious percentage are both used in the calculation of service fees, dictating that data on both impervious and gross area be assembled. Typically, under this type of methodology the impervious area of each property is charged at varying rates depending on the percentage of imperviousness of the property. Each square foot of impervious area is charged more as the percentage of imperviousness increases. Gross area is not relevant to the service fee calculation, except that it is needed to determine the percentage of imperviousness. Undeveloped lands would not be charged because this rate methodology would be based on impervious area.

Some anomalies may occur in service fees under this type of rate methodology. Smaller properties are often charged more than larger properties that have the same amount of impervious area because the percentage of imperviousness on the smaller property is higher. The typical approach divides properties into several classes based on their percentage of imperviousness (referred to as “ratio groups” or “imperviousness classes”) and applies a varying rate per impervious area unit to each class. For example, properties having ten (10) percent imperviousness or less might be charged $.04 per year for each 100 square feet of impervious coverage, while properties with eleven to twenty (11 – 20) percent imperviousness might be charged $.10 per year for each 100 square feet. Proportionately higher values are usually applied as the percentage of imperviousness increases.

Being based on two parameters that are accurately measurable (impervious area and gross area, from which the percentage of imperviousness is calculated), this approach gives an impression of greater accuracy than some other options. Engineering judgment is introduced to the service fee calculation in the schedule of charges for various imperviousness classes. It is questionable, however, whether this method actually generates service fees that are more accurate in relation to actual runoff discharged from individual properties and/or to the cost of services and facilities.

The community’s perception of equity resulting from this rate methodology may be mixed, and may depend on the number of classes or ranges used for percentage imperviousness and the schedule of rates assigned to them. To the extent that a shift in the apportionment of costs toward more heavily developed properties benefits single-family residences, homeowners would likely see a lower bill than under other rate structures. They might view the balance of services and charges favorably. As originally applied in Denver, Colorado, this methodology resulted in much higher charges for intensely developed properties than would be the case under other stormwater rate structures. While that approach benefits residential properties, intensely developed commercial properties bear a much higher proportion of the cost of service.

It must be recognized that this methodology can create anomalies in the service fees relative to those that result from other rate methodologies. For example, a smaller property (gross area) with the same amount of impervious coverage as a larger property would pay more under this methodology. Comparing a half-acre property (21,780 square feet) with a 30,000 square foot property when both have 20,000 square feet impervious coverage, the example schedule of rates would yield service fees of $240 per year for the smaller property and $152 for the larger one. The smaller property would be charged almost sixty (60) percent more. Clearly, these calculations are a function of the specific schedule of rates used in this example and could be changed by simply adjusting the schedule. However, the potential weakness of this approach in terms of equity problems is evident. The general problem of rate and service level balance cited for other rate structures applies more or less equally to this approach.

This rate concept would require that both gross area and impervious area data be gathered. Generating data for two parameters rather than a single parameter could cost an estimated $1 to $6 per account, based on historical information from communities using this methodology. Incorporating a simplified charge for single-family residences could significantly reduce the number of properties requiring specific data, perhaps by as much as seventy (70) percent. Future maintenance of the data for developing properties could be accomplished by requiring that gross area and impervious area data be supplied to the Town by each developer's engineer or architect as part of the project plans.

The stability and sensitivity of this rate methodology is consistent with the other options considered in this report. Even using a highly progressive schedule of rates, the level of service fees would probably not induce property owners to remove impervious area from their properties. It simply is not cost effective for most property owners to reduce the impervious area (and thus impervious percentage) just to reduce a stormwater service fee.

3.5.3 Impervious Area and Gross Area

Both the total property area (gross area) and impervious coverage of properties influence the amount, peak rate, and make up of stormwater discharged to the public drainage systems. A combined impervious area and gross area rate methodology can be a relatively simple and effective means of accounting for the two primary parameters that influence stormwater runoff. However, most stormwater rate methodologies utilize one or the other parameter in the calculation of fees rather than both. A few use both parameters to derive percentages, ratios, or other figures, which are then used in rate calculations.

This type of rate methodology requires that the mix of impervious and gross area in the service fee calculation be “tuned” to properly reflect the significance accorded to each parameter. This is achieved by applying weighting factors to gross and impervious area or by allocating certain costs of service to each parameter. The relative weights assigned to gross and impervious area should be consistent with the local hydrologic conditions, patterns of development, program requirements (e.g., operating versus capital needs), the balance of stormwater quantity and stormwater quality in the program costs, and the community's perceptions. Based only on the coefficients of runoff used in hydrologic engineering, gross to impervious area ratios in a service fee calculation ranging from as low as 1:4 to as high as 1:40 might be defensible in a given situation. When costs are allocated to the two parameters, practices elsewhere have tended to assign seventy-five (75) percent or more of the costs to the impervious area component of the rate.

The concept underlying this type of rate methodology is relatively easy to explain and grasp. It is consistent with the public's general understanding of hydrology and the impact that gross

area and impervious coverage has on stormwater runoff. This type of rate methodology tends to allocate more of the cost burden to lightly developed and undeveloped properties than methodologies that are based strictly on impervious area. Depending on the weighting factors used and/or the cost allocations, however, smaller properties that are almost entirely covered with impervious surfaces could conceivably be charged more than larger properties that are undeveloped or very lightly developed with little impervious coverage. A gross area/intensity of development methodology does not directly incorporated impervious area in the calculation, and is likely to shift costs toward lightly developed and undeveloped properties.

Solely for the purpose of illustrating how fees might be calculated, assume that each 100 square feet of gross area might be charged $.05 (five cents) per year. A surcharge of $1.00 per year for each 100 square feet that is covered by impervious area might be applied. This would yield an effective ratio of 1:21 between areas that are pervious and those that are impervious. That is, the area of a property covered by impervious surfaces would be charged twenty-one times as much as the area that is not impervious. Applying the example values cited above to an eight thousand (8,000) square foot property with 2,000 square feet of impervious coverage would result in a total service fee of $24 per year or $2 per month. The charge for the gross area of the property (8,000/100*$.05 = $4/year) would be added the charge for the impervious coverage (2,000/100*$1 = $20/year).

Applying the same values to a small commercial property of 30,000 square feet (about .7 acres) having 20,000 square feet impervious (67%), the annual service fee would be $215.00 per year ($15/year for the gross area and $200/year for the impervious coverage). Thus, the stormwater service fee would be approximately nine (9) times as much as that for the example 8,000 square foot residential property even though the commercial property is only three and three quarters (3.75) times larger in gross area. The proportionately greater increase reflects the more intense development of the larger parcel in this example (67 % impervious coverage versus 25 % for the residential example). If it is assumed that an 870,000 square foot shopping center is completely covered with impervious rooftops and paving, the annual service fee would be $9,135 ($435 for the gross area plus $8700 for the impervious coverage), or $761.25 per month. In both of the commercial examples, the gross area/impervious area rate methodology results in lower fees for the non-residential properties than does the impervious area methodology examined previously. A gross area/impervious area rate methodology might conceivably allow undeveloped properties to be charged which would have to be addressed in policy considerations.

The balance of charges with the level of service would be reasonably good under this approach. However, as cited previously in the assessment of the impervious area methodology, the limited amount of data currently available on the cost of service and the disparate levels of service presently provided in different parts of the Town make it difficult at the outset to create a high degree of specific correlation between the fees and the costs. This would improve significantly as the program is refined in the next few years. The details of this type of rate structure would almost certainly have to be adjusted as the stormwater management program matures over the years.

The cost of implementation and upkeep of this type of rate methodology would be influenced by the unit cost of assembling data for the master account file and the computer programming associated with the billing/collection and billing inquiry response processes. Cost of the master account file might range from $1 to $6 per unit. Using a flat-rate charge for one or more classes of properties would substantially reduce costs. Maintenance of the information might also be simplified by requiring data from developers' engineers and/or architects when plans are submitted.

This approach is comparable to the other options in its stability and insensitivity to external influences. Being based on gross area and impervious area, there is little that can be done by a property owner to reduce the two parameters that determine the service fee.

Applying weighting factors or allocating costs to gross area and impervious area makes this approach especially flexible. A broad range of relative weights could be assigned to gross area and impervious area, and might even be varied to account for unusual conditions in certain areas or the presence of modifying considerations like on-site detention, non-standard service levels, or water quality impacts. System development charges and other secondary funding methods could be based directly on one or more of the parameters used in this type of rate structure.

3.5.4 Gross Area and Intensity of Development

A rate structure based on the gross area of each property and its intensity of development would be very similar to the rate structures currently used by Bellevue and Tacoma, Washington and Cincinnati, Ohio. In most cases, the term "intensity of development factors" is used rather than a "coefficient of runoff", primarily because the engineering terminology is often confusing to lay persons while the relationship of intensity of development to stormwater runoff is easily grasped.

If applied to every parcel, this type of rate methodology would require that the gross area be determined for and an intensity of development rating be assigned to all residential as well as non-residential properties. Most communities have opted to apply a simplified service fee or schedule of fees to one or more categories of single-family residential parcels, but there is no uniform practice. Non-residential properties are usually categorized into groups ranging from “very lightly developed” to “very heavily developed.” If a flat-rate residential charge is not used, all residential properties are typically assigned to one or two of the intensity of development categories.

From five to eight classes or groups are typically used for classifying the intensity of development. An intensity of development factor is usually very close to the coefficient of runoff that would be assigned to a parcel if its hydrologic performance were individually determined. To the best of our knowledge, discrete intensities of development have not been applied to each individual property. Typically, the intensity of development values range from a low figure such as .02 to .20 for very lightly developed properties up to .85 or even .95 for heavily developed industrial and commercial uses.

This approach groups similar properties and applies average values to all within a given classification. For example, all apartments might be classified as multi-family residential with an intensity of development factor equal to .60 instead of assigning individual ratings ranging from .50 to .75 to individual apartment developments. The gross area parameter is the controlling element of the rate calculation for all parcels in a given classification. Thus, an apartment building on 40,000 square feet of gross lot area would be billed one-half the amount charged to an apartment building on an 80,000 square foot property, assuming both were assigned the same intensity of development.

Using the example properties previously cited in this report, if this methodology resulted in a $2/month residential service fee ($24/year), the 30,000 square foot commercial property would be charged $18/month or $216 per year. The example of an 870,000 square foot shopping center property assigned an intensity of development factor of .90 would be charged $783/month, or $9,396/year. This approach could allow service charges to undeveloped as well developed properties.

The perceived equity of this type of rate structure is normally equal to or greater than that of other approaches, but (like the others) the methodology requires a careful explanation to the community. Simplifying the terminology associated with the rate methodology is desirable.

Adjustments to individual bills or even entire classes of properties can be achieved in this type of rate structure by simply reducing or increasing the intensity of development factor for an individual parcel or for a class or other grouping. It is common for jurisdictions using this approach to adopt a policy of assigning an "effective" intensity of development to individual properties in response to service fee appeals, leaving the door open for adjustments that achieve a fair and reasonable rate when anomalous conditions exist on individual properties.

Data requirements associated with this type of rate methodology would be less than for other options. Gross area information could be generated from current databases and/or maps. The assignment of an intensity of development factor would require that engineering judgment be used in reviewing the conditions on each parcel, possibly using aerial photographs. Some additional work would be needed in the event that undeveloped properties were to be charged.

Local development patterns may influence how residential properties are treated. A single residential intensity of development category might be sufficient in a community that has highly uniform residential zoning and development. Two, three or more intensity of development categories might be appropriate in another community that has residential lots ranging from 3,000 square feet to several acres. The Town of Bellevue, Washington uses discrete gross area measures for every property, which has increased data management costs. Long-term maintenance of the account files for an intensity of development rate structure would be slightly less than what is required for options based in some manner on impervious area. Compatibility with the data processing systems should not pose a problem if an intensity of development approach is selected.

This type of rate methodology tends to push a greater proportion of the cost of service onto residential and other lightly developed properties than methodologies based on impervious area. Like the other stormwater rate structures examined in this study, the revenue capacity of the gross area/intensity of development approach is relatively stable and insensitive to external influences. Alterations to properties that would diminish revenue would rarely be economically feasible.

The flexibility of an intensity of development rate structure is equal to or somewhat better than other methods because of the latitude available in defining the intensity categories and assigning intensity of development factors to individual properties. Engineering judgment must be applied in determining the intensity of development (coefficient of runoff) of a parcel in a given situation, and the engineering literature offers rather broad ranges of development intensity values. For example, values from .25 to .45 are not unusual for single-family residential parcels. Single-family residential properties may fall anywhere within this range depending on lot size, the amount of impervious area, soil conditions, slope, property shape, vegetation, and even the location of the impervious areas on the property.

3.5.5 Gross Area (or Impervious Area) and Modifying Factors

A rate methodology could be based on either gross area or impervious area with two or more modifying factors. The purpose of the modifiers would be to refine how the rate structure treats certain conditions on individual sites that are secondary influences on the quantity and quality of stormwater runoff. Gross area could serve as the primary parameter, but the calculation would have to include impervious coverage or the percentage of imperviousness in some manner.

Using impervious area as the primary parameter would implicitly exclude undeveloped properties. Numerous modifying factors might be used in this type of methodology, including but not limited to a peak runoff factor (perhaps based on impervious area, soil and slope conditions), a water quality impact factor, and a level of service factor.

A service fee calculation under this type of rate methodology might begin with a base charge of $.10 per month for every 8,000 square feet of gross area on a property. Various modifying factors might then be applied to increase or decrease the service charge. This approach offers tremendous flexibility. For example, a peak runoff impact factor based on imperviousness could be used to quantify the impact of development conditions and land use. The numerical factor for peak runoff might range from 1.0 to 20.0 or higher. Additional factors for such considerations as water quality impacts and level of service demands might also be multiplied times the basic charge per 8,000 square feet of gross area. Some factors, such as on-site detention, might result in a reduction of the service fee rather than an increase. This could be accomplished by using a value less than unity (1.0) in the formula.

The precise design of an algorithm and range of the various rate factors would have to be determined through a detailed analysis of service costs and the degree to which each factor influences them. This could result in a very complex rate algorithm that would be difficult to explain to the general public. For example, a single-family residential property in the core of the Town might be subject to a basic charge of $.10/month, plus a runoff factor of 9.0 ($.90/month), plus a water quality factor of 5.0 ($.50/month), plus a level of service factor of 5.0 ($.50/month) reflecting the cost of a highly structural stormwater system (as opposed to open ditches), resulting in a total fee of $2/month. A similar property in an outlying area might be subject to the same basic charge, runoff factor, and water quality factor, but have a lower level of service factor (say, 1), and thus have a total service fee of $1.60/month instead of $2.00/month.

The calculation of fees for non-residential properties might be even more complex if factors such as the handling and use of potentially polluting materials on the site and off-site vehicle traffic generation demands were considered. Because of the complexities it is not possible to offer a clear comparison of the service fees that might result for example non-residential properties as projected for the other rate methodology options.

The data management requirements of this type of rate structure also pose a major obstacle. First, the factors to be used in a rate algorithm would have to be determined and validated. Present engineering practices reflect general agreement on the impact that some factors have on runoff quantity and quality, but (as the variations in hydrologic models reveal) the state of the art certainly does not suggest that a consensus exists. Even if a consensus was available and calibration values were generally accepted, it would be an onerous task to assemble a complete and accurate database for applying this type of methodology. Possible parameters include soil conditions, the average water quality impacts and/or pollutant loadings of various land uses, and the mitigative influence of on-site detention, grass swales, or porous pavement.

The cost of initial production and maintenance of such data would be very high for each parcel when compared to the cost of other methods. It would be difficult to justify given the rather moderate service charges that are typical of stormwater management programs. Furthermore, this approach would be so refined as to present a substantial case for a differential rather than simplified fee structure for single-family residences. This might create pressures to assemble discrete data for each residential property, greatly increasing implementation and upkeep costs. Depending on the number of factors used in the rate algorithm, the accuracy requirements imposed on the data, and whether a simplified residential rate would be appropriate, the cost of initial data gathering could easily exceed $20 per account. When compared with the expense of the other options (roughly $.25 to $6 per account), this cost would be difficult to justify on the

basis of marginal increases in equity or a slightly better balance between charges and the cost of service.

This approach could have far greater data processing requirements and thus impact data systems more than other options. Depending on the number of parameters used, the nature of the data, and the design of the rate algorithm, this type of rate structure might demand two to three times as much file storage capacity as other options. It might also require more complicated programming. Additional costs related to processing requirements, on-going management needs, and data storage impacts would be incurred. Since many of the conditions used in rate calculations would be subject to alteration, updating the data could dictate that a separate master file be created even if the charges were delivered on an existing billing.

The stability of revenue generated through this approach would be comparable to that of other options, since the level of the charges would probably make it uneconomical for property owners to institute physical changes that would take advantage of the values in a complex rate algorithm. Gross area clearly could not be altered in terms of the total rate base (loss from one account would always be equaled by an offsetting gain to another), and the influence of individual factors would likely be relatively minor.

The most evident advantage of this approach is the greater flexibility it allows in the design of the rate algorithm and its application to individual properties or classes of customers. The rate formula would be more complicated than under other rate structures, with more opportunities to make minor adjustments and incorporate a variety of credit and added-charge mechanisms based on detailed data. However, the type of flexibility enhancements most feasible for this type of rate concept would introduce even greater costs for data gathering and long-term maintenance, with only minor improvements in overall flexibility compared to other rate options. All things considered, this type of rate structure appears too complicated, costly, and difficult to calibrate and verify to be feasible at this time. While the concept is a desirable extension of the current state of the art, it is neither realistic nor justifiable presently.

3.6 Modifying Factors

A total of seven modifying factors were considered during the rate methodology analysis in developing the Business Plan and in this rate analysis and recommendation. The reasons for using modifying factors to adjust a basic stormwater service charge rate structure include the following:

- improve the overall equity of the financing mix;
- fund special operational and regulatory programs;
- reduce implementation and upkeep costs.

Since the modification factors examined in this study would affect only a portion of the total properties, they have relatively minor impact on total revenue capacity. They are not intended to simply generate additional revenue. Rather, their primary purpose is to improve overall funding equity. In several cases, any additional revenue generated by a modifying factor is merely incidental to the role that the stormwater management program plays as a regulatory and/or operating agency. In the case of a service fee credit for on-site detention, the modification would reduce rather than increase total revenue capacity. The advantages gained using these factors must be weighed against the disadvantages they entail in terms of gathering and maintaining data.

3.6.1 Simplified Single-family Residential Service Fees

The vast majority of cities and counties that have stormwater service fees employ a simplified charge for single-family residences. Some use a single flat-rate charge while others have two or more flat-rate categories or classes of residential properties (usually based on the amount of gross or impervious area). Communities presently using simplified residential flat rates include: High Point, Wilmington, Rocky Mount, Cumberland County, Winston Salem, Gastonia and Greensboro, NC. A few cities use two or more tiers of flat-rate charges, segregating mobile homes, small-lot residential, large-lot residential, etc. These include Charlotte/Mecklenburg, Greenville and the recently proposed rates for Raleigh. Only a few communities use purely discrete charges for each residential property based on the same parameter applied to non-residential properties.

The principal reason for using a simplified rate for single-family residential properties is to reduce the expense of developing and maintaining a master account file and billing system. A simplified residential rate may reduce by up to eighty (80) percent the number of properties for which data must be assembled on one or more parameters such as gross area, impervious area, etc. The cost of developing a file (typically anywhere from $2 to $6 per account) can be cut by 50 % or more simply by grouping residential properties in a single class or a few tiers. The cost reduction attainable through a simplified residential charge is greatest when a multi-parameter rate methodology is used.

Two alternatives were evaluated in the process of rate analysis. One would categorize all single-family residential and duplex properties into one rate category using 3015 square feet of imperviousness based on analysis of these properties. The second would classify each single family and duplex property into one of three categories, based on increments of 2000 square feet of imperviousness (i.e., 200 – 2000; 2001 to 4000 and over 4000 square feet of imperviousness). The Town has data available to distinguish the amount of imperviousness on each property sufficiently detailed to provide a high degree of confidence in the classification of the property into the correct category, which is critically important in the process of rate analysis.

Although the principal motivation for using a simplified residential rate is usually to reduce costs, equity does not necessarily suffer. Detailed cost of service analyses conducted in Cincinnati, Tulsa, and Louisville all indicate that the cost of stormwater management services and facilities actually declines as the gross area of residential lots increases. The analyses suggest that an inverted residential rate structure might even be warranted. This is primarily due to the type and size of drainage facilities required for intense, small lot residential development in the core of urban cities versus large lot suburban and rural styles of subdivision. Small-lot neighborhoods typically require underground structural stormwater systems, whereas large-lot residential areas often have less expensive open ditches and natural drainage courses.

A sampling of the single-family residential housing stock in Chapel Hill suggests a single flat-rate charge for residences would not diminish the overall level of equity of a service fee. Given the age and state of the drainage infrastructure in many older neighborhoods that predominately have small lots, the cost of service in those areas may be higher than in the more recently developed areas with larger lots, newer infrastructure, and more open drainage channels.

Implementation of a simplified residential rate would only require that single-family residences be "tagged" in the master account file. This could probably be done from tax records. File maintenance would involve minimal upkeep costs to track the addition of new single-family residential development. Compatibility with existing or additional data processing systems

should be easily assured. No problems of compatibility are foreseen even if two or more tiers of flat-rate charges are used for single-family residences.

During policy discussions with the Policy Review Committee there was a high interest in distinguishing between smaller impervious single family residential (SFR) properties and the significant number of single family residential properties with over 4000 square feet of imperviousness (based on 2002 data, there are less than 1100 SFR properties under 2000 square feet and more than 1700 SFR properties with greater than 4001 square feet of imperviousness). Because the data is available to make this determination and assignment of classification, it was discussed with the Policy Advisory Committee that the Town utilize a three-tier rate for SFR properties. This was later addressed in a policy discussion with the Town Council. No separate rate structure for single-family residential properties is in the final recommendation after considerable input on options from the Town Council. The rate structure is based on total equity in allocation of costs based on impervious cover on each property.

3.6.2 Base Rate for Certain Uniform Fixed Costs

Chapel Hill's stormwater management program will incur certain fixed expenses that are not related to the amount of runoff generated by individual properties or the level of service that is provided. Expenses such as administrative overhead, risk management (insurance), master planning, maintenance of a system inventory, weather monitoring, and water quality education are difficult to allocate specifically to individual properties or classes of properties. For example, it costs the same to send a bill to a residence as to a shopping center.

In distributing fixed costs among ratepayers, a common "base rate" may be charged to every account. It is generally a more equitable allocation of such costs apportioning them based on parameters like impervious area. Utility rates often include two elements, a "service" charge and a "quantity" or "usage" charge. For example, the service portion of a water or electric utility fee usually covers meter reading, meter maintenance, and some administrative and overhead costs. The quantity portion of the charge recovers generation, treatment, distribution, collection, and capital costs. A stormwater base rate modification for stormwater service fees is simply an extension of the same concept to stormwater management rate design.

Relatively few stormwater service fees include base rates. Those that do tend to use base rates averaging between $.25 and $1.00 per month. Citizens and businesses alike usually view this type of modification as an equitable refinement of a rate structure. The impact on service charges is minimal, usually creating a slight increase in residential charges and a very minor reduction in charges to larger, non-residential properties. The net increase in residential charges is typically between seventy (70) percent and ninety (90) percent of the amount of the base rate component of the total service charge, not one hundred (100) percent. Thus, if the expense of billing, administration, overhead and other fixed costs per account are $180,000 per year and are distributed among 15,000 accounts, each account would pay a base rate charge of $12.00 per year ($1.00/month).

This type of modifier is more advantageous for a large commercial property that has many equivalent units than for a single residence. Non-residential accounts would tend to receive a larger reduction in their differential service fee because most have more than one equivalent residential unit. Since they would pay the same charge for base rate costs, but less on each equivalent unit, their net change would be a comparative decrease in fees. The amount of the comparative decrease would vary with the size and/or impervious area of each property and the rate methodology used.

The impact on total revenue resulting from a base rate is negligible. Proportionately residential rates are higher than when no “base rate” is used and the charges to very large and/or heavily developed properties decline minimally (depending on the rate parameters employed). The impact of such a shift needs to be carefully considered.

3.6.3 Localized Surcharge for Capital Improvements

One of the more significant modifications that might be made in a basic rate structure would be to shift from area-wide funding of major stormwater system capital improvements to a localized surcharge. The most common approach to this is a basin-by-basin (or watershed) allocation of capital costs.

While localizing capital costs appears on the surface to be both proper and practical, potential flaws must be carefully considered. Property owners would pay for the stormwater management systems necessary to serve their area only, and would not bear the cost of facilities elsewhere in the community. However, a potential equity problem exists in using this methodology in Chapel Hill. A portion of the community's prior investment in stormwater management facilities has been made with Town-wide financial support. The remainder was built by developers or other public agencies without similar Town support. They typically either retain and manage the improvements as public facilities (for example, highway drainage systems) or contribute the infrastructure to the Town, which then assumes management.

Stormwater improvements funded by the Town from general revenues have been made on a priority basis in the past without necessarily considering which watershed was involved or where the revenues were generated. The costs of many stormwater capital improvements built in the past have been distributed throughout the community. The cost of others, especially contributed capital built by developers, has been localized by incorporating the costs into the sale of residential lots or rental rates for commercial properties. Shifting to localized allocation of capital costs at this time could mean that areas now in need of system improvements would have to bear the entire cost after having shared in the previous public infrastructure investment that was made in other neighborhoods.

A few communities have enacted stormwater service fee surcharges for properties located in their floodplains, based on the rationale that those properties are receiving a greater degree of service than less flood-prone areas in the form of reduced risk exposure. Boulder, Colorado, for example, employs a modifying factor in its stormwater service fee rate structure by applying a forty (40) percent surcharge to its normal service fees for properties located in its floodplains. The justification, originally expressed in the Town's Ordinance No. 3928, is that stormwater and flood management facilities "above and beyond those needed to protect other parcels of land within the Town will need to be constructed by the Town" in the floodplain.

Boulder determined that a differential of forty (40) percent is consistent with engineering estimates of the difference in cost between lowering flood levels to the historic level versus lowering them below the historic level to protect properties within the historic floodplains. Boulder's Ordinance No. 4946 simplifies the justification, simply citing the need to compensate for additional facilities to protect and serve floodplain properties by adding the flood-prone property surcharge to the stormwater bill.

A floodplain surcharge would generate additional stormwater management revenue, but more refined data would have to be assembled on the flood-prone areas of the Town and the amount of additional revenue that would be created to quantify the revenue potential. The amount of additional revenue cannot be accurately projected at this time because of the limited data that is

available on floodplains and the cost of service attributable only to service requirements of properties located in floodplains.

A floodplain surcharge is not sensitive to external influences, and does not diminish the revenue stability of a basic rate structure, regardless of whether it is based on impervious area, gross area, or some combination of parameters. There is virtually nothing that a property owner could do to remove a property from the floodplain, although flood-proofing may be a practical option for some structures. This type of surcharge is relatively flexible, and the amount and its application to individual properties could be easily adjusted based on new technical information.

The best guide for a decision on this type of modification may be found in the local practices related to funding of water and wastewater system improvements. Similar differences in the cost of comparable service also exist in those systems, and capital costs are not allocated area by area. For example, substantially more investment has been needed to serve areas remote from the water and wastewater treatment facilities than those that are nearby, yet rarely will you find water and sewer rates that include a factor for utilization of the capital investment in distribution or collection systems.

The data requirements for this type of rate modification would be somewhat complicated. Each property would have to be located in its proper major drainage basin and/or sub-basin using topographic maps. The GIS system might enable this to be done relatively easily. This information could be coded in a stormwater master account file, allowing the service fees to be adjusted basin-by-basin (or in some other rational manner) to generate the revenue required to meet capital improvement needs for each watershed. Impact on the data processing systems would include modifications to the file structure and the rate algorithm.

This type of modifying factor would probably cost between $1 and $3 per account to implement over and above the normal expense of developing a master account file. Maintenance of the data would be limited to updating the basin specific charges so they are consistent with changes in the cost of capital improvements.

The compatibility of this concept with existing capital funding policies in Chapel Hill is rather low. The long-term impact of this type of rate structure modification might be to restrict revenue capacity of a service fee methodology well below its overall potential. As localized capital costs are applied to charges in a given drainage basin, the willingness-to-pay of ratepayers in that area could be exhausted. Experience in other communities, including Louisville, Kentucky and Tulsa, Oklahoma suggests that funding stormwater capital needs on a basin approach might ultimately hinder the full build-out of the needed capital projects. The cost of stormwater improvements in many areas is simply more than can be borne by local property owners alone, yet the projects may have Town-wide significance.

3.6.4 Service Fee Credits

Perhaps the most widely practiced modification to basic stormwater management rate structures is the application of a credit adjustment. Credits are commonly provided for properties that have on-site detention or retention facilities to control the peak rate of stormwater runoff and safely store the excess stormwater temporarily or for an extended period. Such controls reduce the capacity requirements (and cost) of downstream systems to attain a given service level and may enhance water quality if properly designed and maintained.

In most cases detention or retention systems are designed to approximate pre-development conditions or the capacity of downstream facilities. Detained stormwater is released at a controlled rate after the peak runoff has receded. Retained stormwater is infiltrated into the soil

or allowed to evaporate, so retention is usually practiced only in areas with excessively drained sandy soils and high temperatures such as Florida and some portions of the western United States.

Service fee credits have also been adopted in some jurisdictions for properties subject to and in compliance with NPDES permits and for public and private secondary and high schools providing approved water quality education programs. The rationale for the latter credit is that education is an emphasized program component in many NPDES stormwater discharge permits. If not provided by the local schools it would have to be performed by the stormwater management entity at additional cost to the ratepayers.

Various means are employed to provide service fee credits to properties having on-site detention.

- Boulder, Colorado's rate ordinance directs that stormwater service fees be reduced for properties providing on-site detention, but the amount of reduction is not specified. That Town's administratively adopted practice is to reduce the normal service fee twenty (20) percent for an on-site detention system that meets its standards for a 5-year storm event detention facility. Systems that meet the 100-year storm event detention requirements are eligible for an eighty (80) percent reduction in the service fee.

- Bellevue, Washington changes the intensity of development classification of properties with detention systems to that of very lightly developed land, resulting in a variety of percentage reductions, depending on the intensity of development classification normally applied to the subject property.

- Charlotte, North Carolina allows up to fifty (50) percent credit for peak runoff attenuation and up to twenty-five (25) percent credit for total flow volume reductions.

- Practices elsewhere are to reduce service fees between twenty-five (25) and seventy-five (75) percent.

The primary intent of credits for on-site detention or retention is to recognize reductions in the cost of public stormwater services and facilities that are attributable to private systems or activities. Typical detention/retention credits against monthly service fees provide a relatively modest economic incentive to developers. Rarely do they offset the loss of space such facilities occupy or the degree to which on-site systems disrupt the layout of commercial properties and subdivisions. Nor do most credits consider the water quality impacts of on-site systems, or their influence on the cost of stormwater quality management.

The structure of credits sometimes changes over time with shifting program priorities, authority, and legal limitations.

The balance of fees with the level of service required and provided is, at least in theory, improved by the use of credits. On-site control of the peak flow of stormwater runoff means that a property requires less service (in terms of downstream capacity) from the stormwater management system. Downstream reductions in peak runoff allow a higher level of service from a given size of facility or enable a community to build smaller systems in the future to attain a given level of service objective, reducing capitalization costs. A detention credit could be valid in Chapel Hill in terms of stormwater quantity management, as well as stormwater quality management controls for water quality protection. A reduction in pollutant discharges into the public systems should translate into lower NPDES permit compliance costs, but it is unclear whether any elements of the Town's current program might possibly be reduced or eliminated

by virtue of the private properties' compliance with their permits. In addition, it is appropriate public policy to consider whether all structures should be eligible for credits if they are required by the Town's current engineering requirements in order for construction of impervious surface to occur. This is a key public policy that must be considered prior to initiation of any credit program.

An additional administrative cost would be incurred to assemble and maintain the data to support credits, especially with regard to existing on-site systems or activities performed by property owners. Developers' engineers can provide the information required to incorporate a credit for on-site detention and other mitigative measures on properties that are developed in the future. Credit calculations are relatively easy. An allowable runoff release rate based on pre-development conditions and required on-site storage capacity can be used to determine the effectiveness of on-site detention facilities for crediting purposes.

No substantial data processing capability would be required to enter a credit into a property's stormwater service fee billing file. The adjustment could be made to the data in the billing file addressed by the rate algorithm rather than by adjusting the parameters used in the basic service fee calculation, or a percentage reduction could be applied to the service fee. This would allow the credit for any specific property to be rescinded easily if an on-site detention facility is altered or is not maintained in proper operating condition, or if a property owner ceased adhering to the conditions of an NPDES permit.

In most communities the long-term impact on revenue resulting from this type of adjustment factor is minor compared to the basic revenue capacity of a stormwater service fee. Credits elsewhere have not diminished long-term revenue capacity more than five (5) percent. Ratepayers who do not have on-site systems (or NPDES permits if a water quality credit is adopted) would have to pay slightly more to cover the revenue reduction resulting from the credits.

3.6.5 Water Quality Factor

The water quality impacts of stormwater discharges are becoming a much greater concern than in the past. Historically, municipalities have focused on flooding, erosion, and sedimentation problems resulting from stormwater runoff because of their direct and visible impact on people and property. As the general public's concern for the environment and interest in water quality have grown in recent years, the attention given to stormwater quality has also. As noted above, stormwater service fee credits for water quality control are now being adopted in some jurisdictions. In the same spirit, a water quality "factor" might also be applied within the basic rate methodology to allocate increased Town costs associated with water quality impacts to those properties having the greatest influence on the need for pollutant control services and systems.

The Water Quality Act of 1987, amending the Clean Water Act on 1972, requires that NPDES stormwater discharge permits be issued by the United States Environmental Protection Agency. The North Carolina Department of Environment and Natural Resources (DENR) has received delegation of primacy to administer such permits and regulate pollutant discharges to receiving waters from stormwater outfalls. The Town has recently submitted an application for compliance with the temporary Phase II regulations on NPDES and a renewal may have to be negotiated with DENR within the analysis period.

With this mandated addition of water quality to traditional stormwater control functions in mind, several cities and counties have adopted or are considering modifications to their stormwater service fee rate methodologies to better account for water quality impacts. In the converse to

the stormwater quality credit mechanism, a water quality factor might be adopted that increases the service fees applicable to properties that either discharge greater amounts of pollution in stormwater runoff or have the potential of doing so if certain controls are not instituted and maintained.

The key difficulty in administering this type of fee factor is that the attributes, characteristics, or conditions of properties which degrade water quality are hard to conclusively identify and may change quickly. It is difficult to assign such costs specifically to individual properties on the basis that their on-site conditions or actions might cause water pollution if they did something wrong.

Quantifying their impacts on the cost of public services and facilities at an acceptable level of accuracy for cost allocation purposes is virtually impossible at this time because of the limited data available. In addition, much of the cost of stormwater quality management is preventive or speculative, i.e. local governments must attempt to identify potential sources of pollution and regulate in various ways to prevent impacts from occurring. Many of the necessary components of an effective program are applied community wide (for example, education) rather than isolated to specific properties.

Analyses conducted during the National Urban Runoff Program (NURP) research project suggest that the single most significant factor influencing pollutant loadings in stormwater is the percentage of impervious coverage. This is logical, considering the typical development patterns and runoff characteristics of intense industrial, commercial, and transportation land uses. Such properties are frequently covered almost totally with roofs and pavement. They are also subject to truck and heavy equipment traffic, and potential pollutants are commonly used, created, or transported on such sites.

Thus, imperviousness (the percentage of impervious coverage) could be used to introduce a water quality component into service charge rates, even if that parameter was not used in the basic rate methodology. The actual use of the land, or the presence or use of pollutants on individual sites might be another consideration. However, these can vary from time to time and would require a great deal of monitoring and data management. Other mitigative conditions are equally hard to track, such as the presence of a grass buffer between paved areas and storm drainage ditches or streams.

In order to minimize the initial expense and data management demands of a water quality factor, most communities seeking to incorporate water quality costs into a stormwater rate methodology opt for imperviousness as the most suitable single measure. Some simply increase their basic stormwater service fee rates to meet the additional cost of service without changing their rate methodology.

3.6.6 Development and Land Use Factor

The act of developing land and the long-term land use both impact stormwater runoff. A rate modifier could be used in conjunction with one or more of the basic rate structure concepts to account for the temporary impact of development and/or the permanent effects of land use on the quantity and quality of stormwater discharged to the public systems. The objective of this type of modifier would be to improve the equity of the distribution of the cost of services and facilities, especially as it pertains to properties undergoing development and those that have unusual impacts associated with their land use.

A development and land use factor can be designed to reflect the influence of site conditions that may vary among otherwise comparable developments, especially conditions which impact

stormwater quality or quantity only temporarily during the development process or when certain activities are underway. The challenge is to define such influences with reasonable accuracy and quantify their impact. The balance between charges and the level of service provided is not precisely definable at the present time. Efforts to refine basic rate structures by introducing this type of factor have to be designed with the limitations in mind.

Data requirements for a development and land use factor should be minimized to the greatest extent practicable if one is employed. The cost of this type of modifier is primarily associated with the expense of assembling data and maintaining it. The expense could be minimized by using qualitative rather than quantitative attributes and by grouping properties in similar categories. Development activities could be assigned to groups by degree of impact on stormwater systems and water quality. A rate modification value could be assigned to each group. Land use, which is an on-going condition, could be broken down into groups of uses that have similar potential impacts.

The key relationship to be reflected in this type of factor involves the impact of development activities and land use conditions on the cost of services and facilities. Ostensibly, it would include consideration of water quality as well as runoff quantity impacts. Data from planning, tax, hazardous and toxic materials inventories, and other existing sources may be sufficiently detailed to define groupings of land uses.

Virtually any approach would be compatible with the service fee calculation and billing options being considered, even if a secondary formula or reference to the another file was required to generate this type of modifying factor. Financial sufficiency is not as critical a consideration in modifying factors as in the case of basic rate concepts. A development and land use modification to the basic rate concept would create only minor changes to the service fees for most properties, and would generate a limited amount of additional revenue. The revenue stability of this type of modifying factor is only moderately good because a portion of it is associated with the underlying pace of development. A modifier reflective of temporary development activities would generate only an interim addition to the revenue stream. One related to land use conditions could generate a permanent addition that would reflect the overall impact of certain land uses on stormwater management costs.

The flexibility associated with a development and land use factor is relatively good, since engineering judgment would normally be used in assigning modifying factors to individual properties or dividing similar properties into groups and assigning factors to the various groups. This type of modifier also is very adaptable to changing conditions as local areas are developed or redeveloped. It could create a minor shift in the distribution of stormwater costs of service related to development by assigning a greater portion of those costs to the development community.

3.6.7 Level of Service Factor

Stormwater service levels vary across Chapel Hill. Although the Town's long-term objective is to provide a consistent level of stormwater services and facilities to similar areas and similar properties throughout the area, it is likely that actual service levels will continue to vary for the foreseeable future. In the interim, the Town may wish to consider a level of service factor that would reflect the status of services and facilities in certain areas relative to the Town's service objectives in general. A better balance between the charges and the level of service actually provided to individual properties would improve the equity of cost allocations. However, the cost of doing so at this time through a modification factor may be higher than the additional degree of equity would warrant.

The primary objective of a level of service modifier is to improve the equity of charges when a broad range of service levels is being provided. In general, the Town is providing a minimal level of day-to-day service in most of the urban area. Deficiencies are most commonly exhibited in the form of localized flooding during moderate storm events. The Town has not consciously adopted specific levels of service on a geographical basis, yet it is the nature of the problem that some low-lying or other physical areas may require higher levels of service.

The greatest obstacles to implementing a level of service modifying factor are that the Town has not yet formally defined its service level objectives and does not have the data necessary to determine if specific areas are deficient, meet service objectives, or exceed them. It would be difficult to assign an economic value to incremental shortfalls in service level that now exist. For example, if a property is exposed to minor damage due to flooding during a two-year storm event when the service objective is a twenty five-year event, how might that be reflected in a modification factor which reduces the service charge to reflect the actual service level?

A great deal of preparatory work would have to be done to institute a level of service factor as part of the rate structure. First, detailed information about all the stormwater management systems would have to be gathered so that present conditions could be verified and a realistic service level objective could be defined. Second, the level of service actually provided to individual properties would have to be quantified in some way. Differing levels of service may be justifiable for some areas and/or for individual reaches in a watershed in terms of benefit/cost relationships and efficiency. The master plan now underway will begin to define flow capacity service level objectives, which might reasonably range from a two-year level to a one hundred-year level depending on risk exposures. Third, the value of a diminished level of service below the objective would have to be quantified. The data requirements would be expensive to meet at the present time, given the limited amount of information that is presently available about the drainage systems and equally limited knowledge regarding levels of service.

Compatibility with existing databases and billing systems would not be a problem. A modification factor might be applied to areas or to individual properties based on service level information. This type of modifying factor would not significantly alter the financial sufficiency of a basic stormwater rate concept unless service fees were dramatically reduced to reflect service level deficiencies. Underlying rates might have to be increased to generate adequate revenue to meet the service level objectives. Properties receiving a fully adequate level of service might be charged substantially more in order to meet the overall stormwater revenue objective.

Overall revenue sufficiency and stability could be decreased by introducing a level of service factor into the rate structure as a modifier. It would give ratepayers another basis on which to appeal service charges, citing deficiencies in service level or differences in level of service relative to other comparable properties.

The flexibility added to a rate concept by introducing a service level factor might be substantial. Engineering judgment would have to be employed to define the various levels of service achieved in the current systems, the desired full levels of service that serve as objectives, the value of incremental deficiencies that exist, and how they should be incorporated into rates.

3.7 Recommendation for Rate Methodology and Use of Rate Factors

Based on the discussion in 3.5 and 3.6 above, the Consultant Team recommends the use of imperviousness as the basic allocation methodology and recommends the use of limited modifying factors of service fee credits upon completion of discussions with the University and the establishment of a credit manual and credit program adopted by the Town Council.

Section 4 - Cost of Service Analysis

4.1 Overview

Over the past year, the consultant team and staff have completed an analysis of programs necessary to augment current resources that would, in the long term, address the priorities identified in Section 1 above. Key to development of the rate recommendation is an analysis of costs of service to provide the resources needed to meet these objectives. Utilizing the program initiatives identified in Section 2, a cost of service analysis was completed on program options to determine the resources required to accomplish the stated objectives. The Town Council was provided the comparison of rates and program elements for various levels of service; however, this Section of the report addresses the Town staff/Consultant recommendation for rates only. This analysis is a "resource" evaluation and not a budget exercise. Upon adoption of the user-fee revenue system, the Town will continue to budget resources annually, based on the program of services targeted and the total resources available in each budget year.

The five-year analysis period provides sufficient predictability to determine the ability of the Town to take on new initiatives and the degree to which any one of the priorities can be addressed or services established to begin accomplishing these long-term goals. Projected costs are needed in order to determine the necessary level of service fees, and also to determine the revenue requirements of other funding mechanisms. A full range of stormwater management costs are identified in this report.

4.2 Cost Analysis Methodology and Format

A "cost of service analysis" serves a different purpose, is performed for different reasons, and must meet different standards than the Town's annual budgeting process. Cost analyses are performed to determine revenue needs. Budgets are prepared to facilitate elected officials' oversight of local government services and their financial management, give order to the process of preparing and adopting annual budgets, and support on-going accounting and management control.

The distinction between budgets and cost of service analyses is important. Cost of service analyses are intended to support rate-making decisions rather than budgeting decisions. The Town's annual budgets are prepared in a format that complies with North Carolina Statutes, administrative rules, and generally accepted accounting practices and standards for government entities. Cost analyses are not structured to conform to those guides, but rather to satisfy due diligence standards underlying rate-making decisions by the Town Council.

Similar information must be considered in cost analyses and annual budgeting, but service fee rate-making decisions should not be done in the budgeting process without the benefit of appropriate cost and rate analyses that establish a rationale nexus (link) between the two. Cost analyses may support assigning certain costs to other forms of funding (e.g., general fund appropriations, or special assessments) in support of budget decisions, but are not specifically oriented to the budgeting process.

4.2.1 Cost Centers

The costs and other financial information in a cost of service analysis are organized differently than comparable data in the Town's annual budget. Costs are organized by "program centers", rather than by organizational units or accounting funds as in the budgeting process. The following program centers were used in this analysis.

- **Engineering, Modeling and Planning**
  - Stormwater Quantity Master Planning
  - System/Project Design Engineering
  - Maintenance and Field Engineering Support
  - GIS, Database, and Mapping
  - Technical Services/Public Assistance
  - Best Management Practice Analysis/Design
  - Design Criteria and Design Manual
  - Field Data Collection
  - Hazard Mitigation Planning
  - Code Development and Zoning Support Services
  - Multi-use Planning and Design
  - Flood Insurance and Community Rating System
  - Infrastructure Management Planning

- **Operations**
  - Maintenance Management
  - Customer Service
  - Storm Sewer and Culvert Maintenance
  - Remedial Repair and Replacement
  - Inlet, Catch Basin, and Manhole Cleaning
  - Erosion and Sediment Control
  - Detention/Retention System Maintenance
  - Ditch, Channel, and Stream Corridor Maintenance
  - Curb and Gutter Maintenance
  - Infrastructure Management Program
  - Public Assistance Program
  - Emergency Response

- **Regulation and Enforcement**
  - Code Development and Enforcement
  - Stormwater Permit Administration
  - Drainage System Inspection and Regulation
  - Zoning and Land Use Regulation Support
  - Special Inspection Programs
  - Dumping Regulation Program
  - Floodplain Management
  - Erosion/Sediment Control Regulation

- **Capital Improvements**
  - Major Capital Projects
  - Small Capital Projects
  - Land, Easement, and Rights Acquisition
  - Equipment

- **Water Quality**
  - Stormwater Quality Master Planning
  - NPDES Permit Administration and Reporting
  - Watershed Assessment
  - Water Quality Monitoring
  - Best Management Practices Development
  - Water Quality Retrofitting Program
  - Installation of BMPs
  - Illicit Connections and Illegal Dumping Program
  - General Commercial/Residential Program
  - Spill Response and Cleanup Program
  - Industrial Runoff Control Program
  - Public Education Program
  - Emergency Response
  - Habitat Assessment

- **Administration, Finance and Billing**
  - General Stormwater Program Administration
  - Billing, Finance and Customer Services
  - Legal Support Services
  - Personnel Services
  - Administrative Support Services
  - Program Planning and Development
  - Inter-agency Coordination
  - Public Education Programs – General
  - Indirect Cost Allocations
  - Unspecified Overhead
  - Cost and Rate Analysis
  - Emergency/disaster Management

4.2.2 Expense Categories

Four expense categories are designated under each major cost center in this report: Personnel (salaries and wages), Supplies (commodities), Services (contractual), and Capital Expenses (capital purchases and capital construction). These categories correspond to the major categories in the chart of accounts for expenditures used by the Town in its budgeting and accounting systems. Using these categories in the cost analysis will make translating the cost of service information to the Town's budget format easier.

Personnel costs assigned to the stormwater program in our analysis are limited to the direct salaries and wages of staff that will be managing the program as well as carrying out or overseeing the engineering, planning and water quality protection services to the community. The costs of these positions include the direct benefits and overhead that support the salaries of personnel throughout the Town organization.

After reviewing the current program, which is dispersed among several departments, we concluded that a focused management and technical team are needed. We propose a team of eight full-time positions, created over the five year planning period that would be direct salaried positions funded under the utility account. The positions might be titled Stormwater Services Program Manager, Stormwater Development Services Engineer, Water Quality Technician, Public Education Coordinator, Stormwater Engineering Technician (2 positions), Stormwater Administrative Assistant and Construction Management Coordinator. We recommend that the

current Stormwater Engineer position in the Town personnel structure be restructured as the Stormwater Services Program Manager, and that the Development Services Engineer and the Public Education Coordinator be hired in the first year, resulting in four positions by the end of Year 1 of the program (currently there are two full-time positions, the stormwater engineer and a stormwater technician).

The Construction Management Coordinator, the Water Quality Technician, and the Stormwater Administrative Assistant will be hired in year 2 and the second Engineering Technician be hired in year 4. This will provide the full complement of positions directly charged to the enterprise fund by the end of Year 4, and ensure a successful implementation of the watershed master planning and water quality permit compliance.

In addition, the operations and maintenance program will provide increased maintenance, both of systems located in street rights-of-way and along open channels beginning in Year 2. Our cost analysis incorporates the resource requirements that such additional work implies. This does not assume that the Town will necessarily add new staff positions internally but it will provide those resources to the Public Works Department to maintain the efficiencies and effectiveness of similar resources found in the street maintenance program, supporting new positions and contracting out certain services utilizing the most appropriate mix of resources available to achieve the desired goals..

Some or all of the new stormwater positions might be created by renaming and transferring existing positions from other departments. Town field crews might be supplemented in some cases by outside contractors with special expertise and equipment, and consulting engineers might be retained to assist with design and other technical issues. Other existing personnel are supported by revenue receipt into the General Fund from the Utility as a “purchase” of services by the Utility Fund from the General Fund, such as engineering and inspection needs.

The wage, salary, and benefit costs associated with personnel positions proposed were estimated based on the Town’s compensation schedule. To ensure a full accounting of direct personnel costs attributable to the Utility, an average overhead burden of twenty-eight (28) percent was applied. This covers retirement, health insurance, and other payroll related costs associated with employment.

The cost of Supplies and Services was estimated by evaluating the program strategy, projecting what will be needed to carry it out, estimating the mix of in-house and outside services, and referencing current costs as indicated in the Town’s budget and related to us by the staff in interviews. The cost of completing the recommended system planning and inventory maintenance activities was projected based on experiences in other similar situations. It is assumed that private vendors will provide a portion of that work and the cost will be treated as a service expense. Town staff in other departments may be directly involved, and it is assumed that their participation will be also treated as services through the full-cost-accounting practices of the Town.

Capital Expenses are limited to costs that will be incurred directly by the Utility, including construction of improvements to the drainage systems, land, easements, computer hardware and software, capital equipment, plus the annualized debt service of capital improvement bonds issued to pay for such assets, should bond financing be utilized. We also assumed that the cost of equipment used for a variety of Town functions will be shared equitably with the other accounting units that make use of it, with initial capitalization of equipment being funded by the Town through lease-purchase strategies in place and billed to the Utility in proportion to its use for stormwater operations (e.g., camera equipment for Public Works crews which is used to inspect the underground systems).

As noted previously, some uncertainty remains regarding the total infrastructure capitalization needs that will be identified through the Master Plan process. We have assumed that an initial capital program based on the plan could be funded beginning in Year 2 with some minimal increase in resources. In Year 3, additional capital funding is programmed. However, depending on the magnitude of capital improvements identified in the Watershed Master Plan process, the Town may choose to issue Revenue Bonds in Year 4 to increase the available resources for the CIP program. Should that occur, the Town is advised to complete a cost of service update and new rate analysis to determine if a rate adjustment is needed to support the CIP program.

State highway projects that include stormwater facilities and contributed capital stormwater assets built by developers are not included in this cost analysis.

4.3 Assumptions

The following assumptions have been used in projecting the cost of service.

- The program strategy drives the cost analysis. It sets forth an increased level of effort that will resolve many long-standing drainage problems. It does not call for simply maintaining the status quo under a new funding source. Planning is a keynote of the program strategy along with a growth in overall services to the Town over time, and this results in increasing costs of service each year during the analysis period.

- In addition to annual operating and capital costs, it is assumed that non-operating costs, like allowances for service fee delinquencies and unspecified operating and capital expenses to provide for emergency situations, will be recovered through the service fee. However, these additional revenue requirements are not identified as costs. They are identified and accounted for in the rate study (Section 5 of this report) in order to project the pro forma cash flow of the Utility.

- All costs are stated in constant 2004 dollars in the cost of service analysis. A conservative annual inflation factor of three and one-third (3.3) percent is incorporated into the rate model. The inflation factor is applied only to annual operating expenses.

- The costs are based on a service area covering only the Town. It does not include any neighboring incorporated municipalities or surrounding unincorporated areas. If the Utility is extended by intergovernmental agreement into other municipalities or unincorporated areas, the additional costs of those services will need to be determined.

- We anticipate that the extent of the Town's system responsibilities will change during the five-year analysis period. Initially the Town will be limited by the lack of access to some components of the drainage systems. Over time access will be gained by easements, rights-of-entry and use, and even fee simple ownership of some corridors. This may result in lower than projected operational and capital costs during the analysis period while access issues are resolved; however, long-term growth in overall operational costs should be anticipated.

- The rate methodology, the geographical extent of the service area, and the pace of economic development will all influence the growth of the rate base over time. We project very limited growth in the rate base during the analysis period. New development is estimated to increase the rate base one and a quarter (1.25) percent annually. This is a conservative estimate and may slightly understate the actual growth

rate of service fee revenues that will occur should the Town annex any area of significant growth.

- We assume that the stormwater management program will be accomplished by using a mix of in-house resources and outside contracted services. The balance between in-house personnel and contracted services will vary as the program matures and experience is gained, but we do not expect it will significantly alter the cost of service during the initial five year planning period.

- We assume that the physical stormwater system assets and some rolling stock and other equipment owned by the Town will be transferred to the Utility enterprise fund account at no cost. Therefore, it is also assumed that the cost and rate analyses need not account for the capitalization or any previous depreciation of the transferred assets, especially the drainage system infrastructure. Due to the age of many of the stormwater assets and our assumption that their transfer would be without cost to the enterprise, we believe that the Governmental Accounting Standards Board (GASB) Statement 34 may not be applicable to such assets and thus depreciation is not included in the cost and rate analyses. The Town may wish to refer this issue to its accounting staff, attorneys, and outside counsel for their opinions and to ensure consistency with the Town's practices.

- We assume a growth in program efforts to occur over the first three years of the program, requiring a rate increase annually in years 2 through 4. The rate model uses ten (10) percent in years 2 and 3 and a three (3) percent increase in year 4.

4.4 Uncertainties Influencing Costs

Several uncertainties may influence the actual costs of service that the Town will experience as the program strategy is implemented. Some of these uncertainties can be controlled or managed by the Town. Some will simply pose decision choices that have cost implications. In a few cases, the Town's choices will be relatively limited. For example, the Town cannot unilaterally decide that the NPDES Phase II water quality program requirements are too costly or not needed, and refuse to comply with the permit requirements without considering the exposure to fines and other sanctions that are attached to non-compliance. In practical terms, compliance with the NPDES mandate is not optional, so this cost analysis assumes that the Town will fully comply with the conditions of its eventual permit. We estimated the likely costs that will be associated with the renewal of the permit and requirements that will apply, but the expectations of DENR in that regard have not been clearly articulated so some uncertainty remains.

We have assumed that the Orange County property tax billing system will be a viable means of distributing stormwater service fee bills, collecting payments, and accounting for the money. Stormwater bills for some properties will go to non-taxable properties so "stormwater only" accounts may have to be merged with the existing billing system or the Town may need to establish a limited number of accounts that it will bill directly. A reasonable percentage of the cost of billing, collecting, and accounting for payments through the County's tax billing system, plus part of the expense of long-term customer service, is assigned to the Utility in this cost analysis. There is always some uncertainty involved in modifying billing system hardware and software to accommodate an additional service billing.

The initial stormwater billing will generate many customer service contacts. This implies an implementation expense of uncertain magnitude at this time. This cost analysis assumes that the Town will apply special effort to educating the community regarding the Utility before it is

established, and that addressing customer inquiries when the service fee bills are initially mailed will be a high priority. We assume that the Town will train current staff to specifically to deal with questions about the stormwater service fee, providing sufficient guidance so that all key points of contact with the public will be aware, to some degree, of the new program and fees and will either be able to address a concern or refer a citizen to the correct staff for assistance. Responsiveness is critical to successful implementation.

We foresee at least two key issues; future rate increases and the disposition of General Fund revenues previously spent on stormwater management. We have evaluated the service fee rate impacts of alternative decisions on these issues. This report addresses the service fee implications during the analysis period. In addition, the point at which the Watershed Master Planning provides sufficient details on the capital program needs for major systems, a new program and rate study should occur. The Town will bill itself for Town-owned public properties, excluding roadways used for public transportation. A portion of the General Fund current resources transferred into the Utility will be needed to pay the Town's own stormwater bill. The General Fund will be relieved an amount equal to the current level of direct stormwater funding ($750,000 approximately) less the fees due for Town-owned developed property.

The Town may occasionally need to revisit its basic rate decisions, as various uncertainties are resolved such as the amount of the payment of fees by the University. The progress of the program and suitability of the rates and revenue stream should be evaluated each year by the staff to determine if any change in methodology or rates appears to be warranted. It is recommended that the rate be reviewed in Year 3 or Year 4 at the latest, to ensure that the rate is providing the resources needed and to take into consideration the capitalization needs of the initial Watershed Master Plans completed at that time. The need for adjustments to the rate methodology and/or the level of charges would depend primarily on the pace at which enhancements in operations and maintenance occur, the magnitude and timing of capital expenditure needs, whether bonding is employed to pay for major projects, and future NPDES requirements. These issues involve numerous uncertainties that may impact costs.

4.5 Estimated Expense by Major Cost Center

4.5.1 Administration

Administration, Finance and Billing
- l Stormwater Program Administration
- Billing, Finance and Customer Services
- Legal Support Services
- Personnel Services
- Administrative Support Services
- m Planning and Development
- Inter-agency Coordination
- Public Education Programs – General
- Indirect Cost Allocations
- Unspecified Overhead
- Cost and Rate Analysis
- Emergency/disaster Management

Table 4.1 summarizes the estimated cost of stormwater management administration for the five-year analysis period. As suggested by the functions listed in the box to the left, it encompasses a variety of administrative activities and support costs. Only direct administrative costs of the stormwater program that are not assignable to other cost centers are allocated to the administration cost center. Administrative and overhead costs, including personnel, supplies, and contracted services that could be directly assigned to the engineering, operations, regulatory, capital improvement, and water quality cost centers were so allocated in this cost analysis.

A substantial portion of two personnel positions, the Stormwater Services Manager and the Administrative Assistant, is allocated to the administration cost center as well as a portion of the time for oversight by the Town Engineer. The cost estimate assumes that a portion of other Town staff positions that are involved in the administration of stormwater management, but assigned to other accounting funds (e.g., Town Attorney), will be allocated to the Utility

enterprise fund through an indirect cost or overhead allocation which is addressed in the Cost of Service analysis under Administration.

Table 4.1 Administration Costs of Service

	Year 1	Year 2	Year 3	Year 4	Year 5
Personnel	$ 34,278	$ 80,983	$ 72,125	$ 94,432	$ 120,113
Supplies	10,200	12,400	10,000	11,800	11,000
Services	131,198	150,447	153,446	162,004	166,985
Capital Expenditures		6,000	3,000	20,000	11,000
Total	$ 175,676	$ 249,830	$ 238,571	$ 288,236	$ 309,099

Supplies and Services costs related to the administration of the program include office mobilization, copying, telephone, office supplies, postage, radio and communications, and other support items. The administration cost center includes outside services such as billing, finance, special legal counsel, personnel recruitment and advertising, and general public education costs such as audio-visual presentations, brochures, displays, and opinion and customer service surveys. It is assumed that an outside cost of service analysis and rate study will be required in Year 3 to reevaluate the rate structure. An additional analysis will be needed in Year 5. Capital expenditures allocated to administration are limited to office equipment, furniture, and computer hardware and software.

4.5.2 Engineering, Modeling and Planning

Engineering, Modeling and Planning
Stormwater Quantity Master Planning
System/project Design Engineering
Maintenance and Field Engineering Support
GIS, Database, and Mapping
Technical Services/Public Assistance
Best Management Practice Analysis/Design
Design Criteria and Design Manual
Field Data Collection
Hazard Mitigation Planning
Code Development and Zoning Support Services
Multi-use Planning and Design
Flood Insurance and Community Rating System
Infrastructure Management Planning

Much more emphasis will be placed on stormwater engineering and other technical functions as the Town shifts from a largely reactive approach to stormwater management to one that identifies existing and future needs and plans timely preventive measures and solutions on a system-wide basis. The estimate of engineering costs summarized in Table 4.2 is based on a projected schedule of engineering activities that we believe will be consistent with the type of capital projects known today, the rate of development within the community and the Master Planning process.

Engineering functions will support operational programs as well as construction of capital improvements. This will be especially important during the first few years as routine maintenance is upgraded, remedial repairs are constructed, and master plans are translated into project designs. For example, in Year 1 engineering activities will focus on the Watershed Master Plan process and support of on-going development services. Then the engineering emphasis will shift to major capital projects identified in the Master Plans and funded either through a rate increase or a bond issue, or both. Over time the engineering functions will gravitate toward technical support of maintenance and water quality functions.

Table 4.2 Engineering Costs of Service

	Year 1	Year 2	Year 3	Year 4	Year 5
Personnel	$58,291	71,401	71,954	97,144	118,175
Supplies	2,700	4,600	4,600	4,600	4,600
Services	231,160	212,500	237,500	222,500	222,500
Capital Expenditures		5,000	-0-	6,000	5,000
Total	$ 292,151	$ 293,501	$ 314,054	$ 330,244	$ 350,275

Engineering also involves assembly and maintenance of data about the drainage systems. Information management database systems will need to be created or expanded to support operational and regulatory activities. The Town's stormwater drainage system records are incomplete and a completed system inventory, field verified and updated with additional data points, should be a primary goal in support of the Master Plan process for watershed evaluation. Because many of the other enhancements to the stormwater program are dependent on this information and related engineering analyses, preparing system and access inventories has been emphasized in the recommended program strategy in concert with Master Planning efforts.

The engineering costs estimated in this analysis for personal services and operating expense (primarily Town engineering resources and private consultants) are predicated on: 1) providing an internal engineering management capability within the Stormwater unit staff; 2) relying heavily on the Town's engineering group and private consultants to meet engineering needs that vary significantly during the course of the year or change from year to year; and 3) deferring any decision on whether to provide additional in-house engineering, technical support, and construction management capability beyond those recommended in this study, until after a major capital improvement program is decided upon, through the drainage Master Plans and initiated through Town Council adoption of a CIP for drainage.

A new full-time Development Services Engineer position (hired by the third quarter of Year 1) along with an additional engineering technician (hired by the 2nd quarter of Year 4) is identified for the stormwater program staff. The Utility will "hire" additional engineering services from the Town's Engineering group and private vendors. These may include project managers and technical specialists, with primary responsibilities including master planning, inventory of system, construction management, formulation of development regulations, and support of water quality programs.

The Supplies costs cover basic materials and supplies required by the engineering staff of the Utility. Most Services costs are related to contracted professional engineering services to be provided by the Town and/or outside vendors. The only capital cost assigned to the engineering cost center is for office furnishings, computers, and suitable software for the new engineering staff.

4.5.3 Operations

The estimated operational costs of the program summarized in Table 4.3 are intended to: 1) make substantial progress toward attaining a preventive level of routine maintenance; and 2) reduce the backlog of remedial repair needs that has been growing each year as older stormwater systems continue to age and deteriorate.

Table 4.3 Operational Costs of Service

	Year 1	Year 2	Year 3	Year 4	Year 5
Personnel	$ 5,222	$ 7,164	$ 7,690	$ 9,863	$ 7,783
Supplies	58,400	60,800	70,800	70,800	70,800
Services	404,500	607,400	657,400	655,900	657,400
Capital Expenditures	5,000			5,000	
Total	$ 473,122	$ 675,364	$ 735,890	$ 741,563	$ 735,983

The projected operational costs are based on an estimate of system conditions drawn from brief field investigations and extensive discussions with staff. A detailed system inventory providing a condition profile was not available. Routine cleaning, remedial repair, and replacement needs that presently exist were estimated based on input from staff. An estimate was also made of the age of the systems, which assists in evaluating the impact of deterioration due to aging. These circumstances combine to influence both routine and remedial maintenance demands. Productivity assumptions based on the Town's existing budgets and experiences and those of comparable programs elsewhere were used in projecting the operations resource requirement. We must stress that these estimates may not fully account for the cost of meeting the stated objective of attaining a preventive level of service. The Master Plan process will provide important information on unmet maintenance needs.

Operations
Maintenance Management
Customer Service
Storm Sewer and Culvert Maintenance
Remedial Repair and Replacement
Inlet, Catch Basin, and Manhole Cleaning
Erosion and Sediment Control
Detention/retention System Maintenance
Ditch, Channel, and Stream Corridor Maintenance
Curb and Gutter Maintenance
Infrastructure Management Program
Public Assistance Program
Emergency Response

It was determined that substantially achieving a preventive level of routine maintenance service in ten years is potentially attainable, but only if the Town commits to significantly increasing the resources applied to that purpose. One advantage offered by the five-year timeframe used in this report is that the operating strategy can be easily adjusted to fit evolving needs once experience is gained in the field and suitable support systems are in place.

The projected expenditures arrived at through this process assume that the growth of operational capability will occur in Year 2 with sufficient resources to provide the equivalent of an additional dedicated crew in the Public Works Department to focus on backlog. The resources address both labor demands and the supporting equipment to ensure that they are responsive to the needs. The Town can increase staff resources for stormwater maintenance, out-source other street maintenance needs and reallocate staff to the stormwater program, or contract out the services in its entirety. That is a decision of the Town Council and the Town leadership.

We believe that the maintenance can be primarily proactive in ten years, assuming that adequate resources are allocated to that purpose, access can be gained to the systems requiring attention, and additional staffing and/or private vendor services can be obtained. Additional system deterioration will no doubt continue to emerge as the infrastructure ages. The amount of remedial repair work that will need to be undertaken will also depend on the Town's policies regarding the extent of service to be provided, and the pace at which easements, right-of-way ownership, and other access rights can be acquired. The Town may take on more responsibility along State-system streets to create a more consistent response to the citizens and businesses in Chapel Hill. Policy decisions such as this will impact the extent to which

resources are adequate. During the rate review in the third program year, consideration should be given to whether progress is being made on building a proactive, responsive maintenance service at a pace acceptable to the community.

This analysis assumes that the Town's street maintenance crews will perform most of the routine maintenance and some of the remedial repairs. We assume that Public Works Department crews will continue to perform maintenance of the systems. The option exists to solicit outside services, but the level of effort and cost should be relatively comparable under either scenario or a combination of the two. It may be more cost effective to contract with private vendors to perform some major remedial repairs and operational functions that are seasonal in nature, for example vegetative control along stream channels. Regardless, the stormwater staff will have to ensure that contract management and oversight of the maintenance and repair work is diligently performed. The actual mix of in-house and contracted services may shift with experience, but the estimated total level of spending contained in this report is a resource commitment consistent with the projected schedules for increasing routine and remedial maintenance activities.

Personnel costs are limited to the partial allocations of the Stormwater unit staff to provide some engineering assistance to the Public Works staff. They will work with them to identify priorities, administer the allocation of work between in-house and outside groups, and provide specialized technical support to ensure that operations and maintenance are consistent with desired standards.

The Supplies category of costs is for materials used in routine maintenance of the systems performed by in-house resources. It is assumed that the utility will either purchase those supplies directly or be billed for them by other Town departments such as Public Works. It is assumed that supplies costs associated with work done by outside vendors will be folded into contract charges, and those costs are treated as Services in this analysis. Supplies required for remedial repairs are included in the capital expense cost category.

Both in-house labor and outside contracted maintenance are treated as a Services expenses in this analysis. Most day-to-day stormwater operations will be provided by the Town's Public Works street maintenance crews. The costs should be tracked and charged to the Utility enterprise fund through full cost account measures in place in the organization. The Town may also hire outside contractors to provide some maintenance and remedial repairs. The current and future requirements of the Town's NPDES permit will likely demand enhanced operations and maintenance for water quality purposes, some of which may involve additional staffing and some that can be more efficiently accomplished by outside contractors.

The capital costs projected for the operational cost center are limited to remedial repairs to the systems. It is assumed that any equipment that will be needed for stormwater operations, such as a new vactor truck, will be acquired by the Town, assigned to Public Works, and billed to the Utility enterprise fund as part of service charges. Such equipment may be used for a variety of purposes, and this analysis assumes that the costs will be apportioned among the user departments, if appropriate.

4.5.4 Regulation

The estimated cost of regulation is summarized in Table 4.4, below. For the purposes of this analysis, the regulation cost center was used to isolate the expense of development plan review and inspection activities associated with

Regulation and Enforcement
Code Development and Enforcement
Stormwater Permit Administration
Drainage System Inspection and Regulation
Zoning and Land Use Regulation Support
Special Inspection Programs
Dumping Regulation Program
Floodplain Management
Erosion/Sediment Control Regulation

stormwater systems and erosion and sediment control. It is assumed that current practices will continue and be improved.

Personnel costs in this cost center are limited to utility staff oversight of plan review and inspection functions that will be performed by other Town work groups. A new Construction Management Coordinator is proposed for Year 2 as well as a Water Quality Technician and will support the work of Orange County to oversee construction underway inside the Town limits as well as local compliance with the NPDES permit requirements. Supplies costs assigned to this cost center support the Construction Management Coordinator. (Such costs for the Water Quality Technician are supported under the cost category of Stormwater Quality). Estimated Services costs are for plan review, inspection, and other regulatory services provided by other Town work groups. Capital costs include a new computer. An additional vehicle is provided under the Services cost category through depreciation charges.

Table 4.4 Regulation Costs of Service

	Year 1	Year 2	Year 3	Year 4	Year 5
Personnel	$ 23,872	$ 68,254	$ 86,685	$ 94,272	$ 78,574
Supplies	0	1,300	1,300	1,300	1,300
Services	49,400	53,200	53,200	53,200	53,200
49,650	0	1,000	0	0	1,000
Total	$73,272	$ 123,754	$ 141,185	$ 148,772	$ 134,074

4.5.5 Capital Expenditures

Capital expenses include infrastructure improvements, land, and acquisition of rights-of-way and access rights. In addition to the actual cost of construction or acquisition, this cost center includes stormwater funded personnel and other expenses directly associated with capital expenditures. Capital Expenditures in the first five years are not expected to include the capitalization of equipment or other assets, other than land acquisition. Major equipment is purchased through lease-purchase (debt financing) and the cost is amortized or depreciated as a service charge to the operating department.

Capital Improvements
Major Capital Projects
Small Capital Projects
Land, Easement, and Rights Acquisition
Equipment

Personnel costs in this cost center are limited to staff responsible for capital program management. This assumes that some project construction management will be performed by the Town Engineering staff and billed to the stormwater enterprise fund through direct cost accounting, but it could also be outsourced to private vendors. Services costs are primarily engineering associated with pay-as-you-go and bonded projects. Capital costs are those related to the infrastructure assets themselves, whether they are expensed or bonded.

Most stormwater capital improvements have historically been provided by a combination of asset contributions associated with private development projects, highway projects, and appropriations in the Town's annual budget (pay-as-you-go funding). The estimated capital expenses for the five years shown in Table 4.5 represent only a portion of the overall stormwater capital investment need that we believe exists in Chapel Hill. The master plan process will provide valuable insights regarding the magnitude of stormwater infrastructure needs the Town faces over the long-term.

Table 4.5 Capital Improvement Costs of Service

	Year 1	Year 2	Year 3	Year 4	Year 5
Personnel	$ 19,187	$ 22,875	$ 39,378	$ 45,845	$ 45,001
Supplies	0	0	0	0	0
Services	5,000	1,000	1,000	1,000	1,000
Capital Expenditures	45,000	100,000	300,000	375,000	465,000
Total	$ 69,187	$ 123,875	$ 340,378	$ 421,845	$ 511,001

We assume that other agencies and private parties will continue to be responsible for some infrastructure investment. For example, the core stormwater components of Department of Transportation highway projects in Chapel Hill will continue to be funded by NCDOT. Some ancillary stormwater improvements along the State highway corridors will likely be the Town's responsibility. Private developers are expected to continue to fund stormwater system improvements in their residential and commercial projects.

4.5.6 Stormwater Quality Management

Water Quality
Stormwater Quality Master Planning
NPDES Administration and Reporting
Watershed Assessment
Water Quality Monitoring
Best Management Practices Development
Water Quality Retrofitting Program
Installation of BMPs
Illicit Connections and Illegal Dumping Program
General Commercial/Residential Program
Spill Response and Cleanup Program
Industrial Runoff Control Program
Public Education Program
Emergency Response
Habitat Assessment

Table 4.6 summarizes the estimated cost of stormwater quality management for the five-year analysis period. It is assumed that the Town's stormwater quality management program will fully comply with the conditions of its NPDES permit. An element of uncertainty exists regarding North Carolina's expectations for the Phase II NDPES program due to difficulties in finalization of the rules. The projected costs represent our current best estimate of compliance with the new permit requirements.

The estimated direct Personnel cost for the water quality program represents a substantial portion of the water quality technician, a portion of the engineering technician positions, and some leadership personnel costs for enforcement and review of regulatory actions imposed throughout the Town. Supply costs are minimal. The projected expense of Services costs includes water quality master planning in conjunction with the water quantity master planning tracked under the Engineering/Modeling and Planning cost category. Services also include some support services provided by other Town departments, as well as projects that will be needed to ensure NPDES permit compliance. Capital expense estimated for the stormwater quality program include monitoring equipment, new computers and stream restoration projects.

Table 4.6 Stormwater Quality Management Costs of Service

	Year 1	Year 2	Year 3	Year 4	Year 5
Personnel	$ 58,765	$ 95,056	$ 122,505	$ 109,031	$ 131,389
Supplies	25,000	500	500	500	500
Services	255,000	265,000	238,000	213,000	213,000
Capital Expenditures	49,800	86,000	60,000	81,000	60,000
Total	$ 238,565	$ 346,558	$ 421,005	$ 403,531	$ 394,889

4.7 Summary of Costs

Table 4.7 presents a summary of the total projected cost of services and facilities. It is important to state that this represents the resources necessary to address the objectives of the priorities defined through the past 12 years of study on drainage issues in Chapel Hill. This is not a budget, as the process of budgeting under the rules and regulations of the State of North Carolina is in the purview of the Town Council each year, as it serves as the governing body of the utility. This summary does not include financial policy impacts such as reserves and bad debt management.

Table 4.7 Total Program Costs of Service

	Year 1	Year 2	Year 3	Year 4	Year 5
Personnel	$ 199,616	$ 345,733	$ 400,338	$ 450,586	$ 491,035
Supplies	96,300	79,600	87,200	89,000	88,200
Services	976,258	1,189,547	1,350,046	1,307,604	1,314,085
Capital Expenditures	50,000	198,000	363,000	487,000	542,000
Total	$ 1,322,174	$ 1,812,872	$ 2,191,083	$ 2,334,191	$ 2,435,320

Section 5 - Rate Study

5.1 Overview

North Carolina Statutes and Chapel Hill's Town Charter enable the Town to perform certain functions, including but not limited to stormwater management, and provide some latitude to the Town's Council in its funding decisions. By using a blend of funding mechanisms and accounting instruments such as an enterprise fund, Chapel Hill can create an independent revenue stream and dedicated stormwater management funding.

Service fee funding under a stormwater utility is now widely practiced. Utility service fee rate-making practices elsewhere are a practical and valid reference in designing a service fee for the program in Chapel Hill. However, we must stress that the most important consideration in the design of service fee rates is the program strategy. The rates must be designed to fit Chapel Hill's needs and circumstances. What works well in one community may not fit the program priorities of another.

Several service fee rate methodologies were examined in the course of this study. They are described in Section 3 of this report. The rate methodologies involve basic rate parameters such as impervious area and gross property area, rate modifiers that might be used to enhance equity or reduce the cost of implementation, and other funding methods that can be blended with service fees.

5.2 Locally Determined Rate Design Decisions

A major advantage of stormwater service fee funding is that the Town Council has broad authority to design its rate methodology to fit local circumstances and practices and achieve an allocation of the cost of services and facilities that it deems desirable and appropriate in Chapel Hill. There are no absolute rules or proscriptions. When local service fee rates are challenged in court, judges generally defer to the judgment of a locally elected legislative authority in rate-making issues, as long as the process is proper and complete and the resulting fees are not illegally discriminatory or confiscatory.

The principle requirement the courts have applied to local elected officials' broad authority is that a utility service fee rate methodology must be fair and reasonable and the resulting charges must bear a substantial relationship to the cost of providing the services and facilities. The latter is commonly referred to as a *rational nexus* test. Elected officials may not be arbitrary and capricious in making decisions involving service fee rates, and the selected rate methodology may not be illegally discriminatory or confiscatory in its application. Beyond those general restrictions, a community's elected officials have great latitude in determining what type of rate structure and level of fees are appropriate.

The issue of discrimination requires some clarification. The fundamental purpose of a service fee rate methodology is to differentiate among various customers so that those who place a greater cost burden on the program and facilities pay commensurately higher fees, as measured in this case by imperviousness on developed property. However, service fees may not be structured in ways that would illegally discriminate among customers based on gender, age, religion, race, ethnicity or other banned characteristics. For example, a wastewater utility providing sewage treatment services and facilities might charge cheese processors a higher service fee per unit of flow than residential customers because the peak amount of flow and the strength of the effluent cheese processors discharge to the sewer system demands larger conveyance facilities and more

expensive treatment processes. However, a given cheese maker couldn't be charged more or less than others simply because they were a Dutch (or Swiss, or Danish) cheese maker.

5.3 Recommended Rate Methodology

Based on the proposed program strategy and the ***Rate Structure Analysis*** described in this report, an impervious area rate methodology is recommended. Impervious area methodologies are used by more than fifty (50) percent of all stormwater utilities.

Single Family Residential Rate: Three approaches to residential fees were considered in this analysis. A rate structure that would cap the charge to single family residential property at 3 billing units, (2) a flat rate for all single family residential properties, and (3) a rate structure that did not limit the amount charged to such property were each evaluated. The Town has sufficient data to provide the level of analysis necessary to establish an appropriate billing unit and to differentiate the demand for service, as measured by imperviousness, within the rate base of single family detached properties. An analysis of all single-family residential (SFR) properties in Chapel Hill indicates that an appropriate billing unit of 2,000 square feet of impervious area be set for the Equivalent Rate Unit, based on the percent change measured at each 500 square foot increment in the total pool of SFR properties in the database. The equivalency billing unit is benchmarked to residential properties for simplicity of understanding within the entire community of property owners.

The ***equivalency unit*** would serve as the divisor for determining fees for all parcels. The purpose of an equivalent unit is to normalize the application of the impervious area rate parameter to dissimilar properties. The actual measured impervious coverage of each property would be divided by the equivalency unit to calculate the number of units to be charged. The number of equivalent impervious area units on each parcel would be multiplied times the adopted rate.

A full range of modifying factors that could be applied to the basic impervious area rate methodology was considered. In the final analysis, we recommend that the Town adopt only one modifying factors as part of the initial rate structure, the use of service charge credits.

Secondary funding methods are a key element of the funding strategy. The most significant secondary funding opportunity could involve retaining the appropriation of General Fund resources for a portion of the stormwater management costs. Approximately $750,000 was budgeted for primary or direct stormwater functions in Fiscal Year 2003. Service fees revenues could partially or totally substitute for these sources of funding. Consideration was given to retaining the General Fund contribution to manage the overall program and it was determined that the more equitable and appropriate process would be for the Town to charge itself for all developed properties, maintaining the integrity of the rate structure and rate base for the utility. It is also recommended that the Town leverage utility fees for grants from the State of North Carolina or Federal grants and other cost-share programs such as partnership with the US Geological Service on stream monitoring. One or more of the other modifiers may be worthy of reconsideration in the future.

The following funding methods were judged to be potentially practical for the Town's stormwater management program at some point in the future. They are not recommended for immediate implementation, but should be considered as the program moves forward and the program and cost of service information becomes more refined.

- Special fees termed "system development charges" could be applied to new development to equalize financial participation in capital costs over time, especially if the

Town aggressively pursues funding of the capital improvements identified in the master plan.

- In-lieu-of-construction fees could be adopted that would allow developers to participate in the cost of regional stormwater facilities as an alternative to requiring that every development build on-site stormwater detention systems.

- Special assessments might be used to expedite small, localized capital improvement projects, but we believe the Utility service fee is adequate for such purposes by applying local surcharges.

- Developer extension/latecomer fees for private stormwater system extensions could be adopted to properly apportion the cost of infrastructure that will serve currently undeveloped areas.

5.4 Projected Rate Base

The "rate base" that will be available in Chapel Hill to support the stormwater program through service fees was determined by preparing a detailed analysis of residential and non-residential properties in the Town. The rate base represents the total of all clients that will be "served" by the utility and charged for its services. Service is broadly defined and applicable to properties in upland areas as well as those immediately adjacent to stormwater systems, major channels and water courses. Virtually every developed property will be served in various ways by the Town's efforts to control runoff, provide for the collection of stormwater runoff, reduce erosion, comply with regulatory initiatives and prevent water pollution by stormwater runoff.

The rate base includes residences, commercial and industrial properties, tax-exempt institutional facilities like the University of North Carolina and local schools, State offices, and other developed lands. Eventually, the total rate base for the stormwater program may also include some parties who are not owners of properties. For example, the Town is required to enforce effective construction site practices by its NPDES permit, including erosion and sediment control. Builders might therefore be charged a special service fee to isolate the cost of inspection of on-site erosion control measures to them. In that situation, they would become a component of the utility rate base.

Table 5.1 summarizes the rate base information. The projected rate base assumes that all properties with impervious area will be subject to the service fee, including those in public ownership and those owned by tax-exempt entities such as churches. The projected distribution of billing units, without consideration of policies regarding roadways and UNC properties, among single-family residential and other properties shown in Table 5.1 is consistent with the experiences of stormwater utilities in similarly sized cities throughout the United States. The Rate Analyses completed included only single family residential and non-SFR properties in the rate base.

Table 5.1 Total Available Rate Base Summary

Property Type	# of Equivalent Units	% of Equivalent Units
Single-family Residential	22,088	32 percent
Non-SFR Properties	22,040	31 percent
UNC Properties	8,244	12 percent
Roadways	17,730	25 percent
Totals	70,102	100.0 %

5.5 Rate and Cash Flow Analysis

A rate and cash flow analysis is used to determine the level of service charges necessary to meet the revenue requirements of the program in the context of several conditions and assumptions. Cash flow is a critical consideration in rate decisions. Unless the rate base grows rapidly, holding a service charge rate constant for several years while program costs are increasing dictates that excess revenue be accrued in the first two or three years and drawn down in the later years of the rate period. We do not believe that the rate base in Chapel Hill will increase at a pace equal to the program costs in the analysis period. Therefore, rate increases will be needed from time to time.

The frequency and amount of possible rate increases are key issues influencing Town/City Councils when they make rate decisions. The rate was analyzed to build the program over time. Results of the analysis are identified in Table 5.2.

Table 5.2
Rate Structure Summary

	Year One	Year Two	Year Three	Year Four	Year Five
Rate Base calculated without roadways and no payment from UNC	$3.25	$3.57	$3.92	$4.03	$4.03

Reserves are provided in all cases to address extraordinary operating expenses as well as emergency expenses and a ten (10) percent fund balance established in year two.

All of the cash flow scenario analyses, completed on this program, are based on the same revenue requirements, ranging from $1.7 million in Year 1 to $2.4million by Year 5 (including inflation of operating expense). **Total spending over the five years is estimated to be approximately $10.7 million,** without addressing an expanded CIP beyond the funding provided. This level of spending will provide an effective operating program and a very good start on meeting infrastructure management needs.

Table 5.3 provides a more detailed pro forma cash flow analysis for the rate. The following points explain some of the terminology in the tables.

- Annual Operating Expense includes all personnel, supplies, and services.
- Capital Expense includes infrastructure additions, land and easements, but does not include contributed capital (improvements built by developers) or projects built and funded by State of North Carolina or federal government agencies.
- Inflation, at an annually compounded rate of three and one-half (3.3) percent, is applied only to Annual Operating Expense in the rate model.
- The Service Fee Revenue Requirement is determined by deducting Other Revenues from the Total Annual Expenses. Other Revenues, such as interest income, grant funds and fund balances carried forward from previous years reduce the revenue that must be generated each year by service fees. Other revenues include fees for special services such as plan review fees for stormwater elements of the plan review process.
- The service fee rates must be set to generate sufficient excess revenue to meet the Service Fee Revenue Requirement, recognizing the non-operating expense items that will

reduce the actual cash flow each year. These include allowances for credits, offsets (payback of $403,000 in Year 1 for cost of utility creation), delinquencies and bad debt as well as contributions to emergency ($50,000 emergency reserve fund established in Year 3) and operating contingency (set at 10% unappropriated fund balance established in Year 2) funds. An Adjusted Service Fee Revenue Requirement is the product of this calculation. The Adjusted Service Fee Revenue Requirement is divided by the total number of ERUs (billing units) to determine the necessary charge per ERU monthly, or $39.00 annually.

- The Service Fee Rate/ERU/Month is set in the rate model to produce a fund balance at the end of each year of ten percent (10%) based on the anticipated operating expense of the following year. This begins in Year 2. A year-end fund balance is a prudent and common provision for municipal utilities that must operate at a financial arm's length from other accounting units. It provides a cushion against high seasonal expenditures, short-term revenue shortfalls, and emergencies such as natural disasters.

Table 5.3
Pro Forma Cash Flow Analysis

Chapel Hill, North Carolina					
Stormwater Cost of Service Analysis/Rate Model					
Revenue/Expenditure (Cash Flow) Analysis					
	Year 1	Year 2	Year 3	Year 4	Year 5
Expenses					
Annual Operating Expense	$ 1,307,568	$ 1,656,761	$ 1,875,199	$ 1,893,279	$ 1,939,595
Annual Capital Expense and Bonded Capital Expense	$ 50,000	$ 198,000	$ 363,000	$ 487,000	$ 542,000
Subtotal: with Inflation	$ 1,357,568	$ 1,909,434	$ 2,300,081	$ 2,442,757	$ 2,545,602
Bond Sale Costs and Debt Service	$ -	$ -	$ -		
Bond Debt Service Coverage	$ -	$ -	$ -	$ -	$ -
Operating Fund Balance - Unappropriated		$ 187,520	$ 1,808	$ 4,632	$ 6,401
Emergency Reserve			$ 50,000	$ 50,000	$ 50,000
Total: Expenses	$ 1,357,568	$ 2,096,954	$ 2,351,889	$ 2,497,388	$ 2,602,003
Other Revenues					
Funds Carried Forward	$ -	$ 17,004	$ 522	$ 1,765	$ 6,692
Bond Sales Receipts and Assocated Funds	$ -	$ -	$ -	$ -	$ -
Other Fees and Charges	$ 30,000	$ 33,000	$ 36,600	$ 41,600	$ 46,200
Interest Income	$ 26,151	$ 33,135	$ 37,504	$ 37,866	$ 38,792
Recovered Delinquencies	$ 25,000	$ 44,011	$ 48,948	$ 55,252	$ 58,790
Other Resources	$ 25,000	$ 120,000	$ 140,000	$ 150,000	$ 160,000
Total: Other Revenues	$ 106,151	$ 247,150	$ 263,574	$ 286,483	$ 310,474
Service Fee Revenue Requirement	$ 1,251,417	$ 1,849,805	$ 2,088,315	$ 2,210,906	$ 2,291,528
Revenue Stream Reduction Allowances					
Delinquencies and Bad Debt	$ 90,000	88,021.05	97,896	110,504	117,581
Offsets	$ 402,000				
Credits		19,579	22,101	23,516	24,457
Total: Revenue Reduction Allowances	$ 492,000	$ 107,600	$ 119,997	$ 134,020	$ 142,038
Adjusted Service Fee Revenue Requirement	$ 1,743,417	$ 1,957,405	$ 2,208,312	$ 2,344,926	$ 2,433,566
Estimate of Service Fee Needed/Year					
Annualized ERU Revenue Requirement	$ 1,743,417	$ 1,957,405	$ 2,208,312	$ 2,344,926	$ 2,433,566
Number of ERU	45,139	45,703	46,983	48,627	50,572
Estimated Monthly Charge per ERU	$ 3.22	$ 3.57	$ 3.92	$ 4.02	$ 4.01
Service Fee Recommendation					
Recommended Monthly Charge per ERU	$ 3.25	$ 3.57	$ 3.92	$ 4.03	$ 4.03
Estimated Annual ERU Revenue	$ 1,760,421	$ 1,957,927	$ 2,210,077	$ 2,351,618	$ 2,445,682
Estimated Year-end Revenue Surplus (Deficit)	$ 17,004	$ 522	$ 1,765	$ 6,692	$ 12,116
Available Funds for Appropriation in Following Year	1.0%	0.0%	0.1%	0.3%	0.6%