TOWN OF CARRBORO
NORTH CAROLINA

STORMWATER UTILITY RATE STUDY

June 6, 2018

BOARD OF ALDERMEN
LYDIA LAVELLE, MAYOR
BETHANY CHANEY, ALDERWOMAN
BARBARA FOUSHEE, ALDERWOMAN
JACQUELYN GIST, ALDERWOMAN
RANDEE HAVEN-O'DONNELL, ALDERWOMAN
DAMON SEILS, ALDERMAN
SAMMY SLADE, ALDERMAN

STAFF
DAVID ANDREWS, TOWN MANAGER
ARCHE MCADOO, FINANCE DIRECTOR
JOE GUCKAVAN, PUBLIC WORKS DIRECTOR
RANDY DODD, STORMWATER UTILITY MANAGER

TABLE OF CONTENTS

Executive Summary 4

1. Carrboro's Stormwater Management Program 5

1.1 Program Structure 5

1.2 Program Challenges 6

1.2.1 Limited Funding/Capacity 6

1.2.2 Regulatory Requirements 9

1.3 Program Opportunities 11

1.4 Five Year Plan for Expansion of Services 12

1.5 Stormwater Advisory Commission 13

2. Stormwater Management Cost Projections 15

2.1 Introduction 15

2.2 Cost Projections 16

3. Fee Analysis and Recommended Rate Structure 18

3.1 Introduction 18

3.2 Analysis 20

3.2.1 Identifying Non-Exempt Properties 21

3.2.2 Assigning Properties as Residential or Nonresidential 23

3.2.3 Impervious Surface Analysis 24

3.3 Recommended Rate Structure 28

4. Implementation Process 30

Appendices 33

Appendix 1 Glossary 34

Appendix 2. Carrboro's Current Stormwater Management Program 36

Appendix 3: Stormwater Utility Fees in NC (From UNC-EFC) 48

Appendix 4: Maps of Non-Exempt Parcels 61

Appendix 5: Summary of Identified Capital Projects/Retrofits 63

Appendix 6: FAQs 64

Appendix 7: Links to additional information 70

List of Figures

Figure 1: Moving from Utility Establishment to Operation 12
Figure 2: Nonexempt Parcels Subject to Stormwater Fee 22
Figure 3: Impervious Area for Residential Parcels 25
Figure 4: Impervious Area Tiers for Nonresidential Parcels 26
Figure 5: Timeline for Rate Structure Adoption 32

List of Tables

Table 1: Administration of Stormwater Services Prior to and With the New Stormwater Utility 6
Table 2: Summary of Town Staff Current Major Stormwater Responsibilities 7
Table 3: Comparison of Carrboro, Chapel Hill and Hillsborough Stormwater Utility Capacity 9
Table 4: NPDES Permit New Activities 10
Table 5: Summary of Current Structural Stormwater Control Measures in Carrboro 10
Table 6: Stormwater Utility Recommended Plan for Phasing in of New Services* 14
Table 7: Three Year Stormwater Program Budget Presented in June, 2017 15
Table 8: Five Year Stormwater Program Cost Projection 17
Table 9: Town Code Stormwater Utility Definitions 18
Table 10: # of Non-Residential Properties by Tier 27
Table 11: Recommended Rate Structure 29
Table 12: Complete Non-Residential Rate Structure 30

Executive Summary

The Town is in the process of establishing a Stormwater Utility that recognizes that stormwater runoff is a community wide problem and that the Town's current stormwater program is not sufficient to comprehensively address the needs. The purpose of this study is to recommend a rate structure as an important next step for funding the stormwater program and formally establishing the Utility. The basis for the recommendations provided are: Carrboro's Town Code, which provides the legal structure; federal and State regulatory requirements; anticipated expenses for the utility; a GIS study of impervious surfaces in Carrboro; and experience from other North Carolina jurisdictions that have implemented utilities. The recommended rate structure is a "hybrid" with a flat fee for single family/small residential properties and a tiered structure for nonresidential properties. The nonresidential rate structure, while tiered, is a direct extrapolation from the residential rate based on amount of impervious surface for a given property. The rate structure is based on the amount of impervious surface relative to the "Equivalent Residential Unit" (ERU) of impervious surface. The premise is that impervious surface is an appropriate metric for determining the impact of stormwater runoff from a given property, consistent with practices across North Carolina and the United States. The recommended rate will support annual gross revenue from fees of a little more than $800k, which will meet operating requirements with a surplus for future capital expenses. An important factor in recommending this rate structure is balancing the level of administrative overhead with the more discrete fees that can be assigned with more accurate and precise but more administratively intensive data.

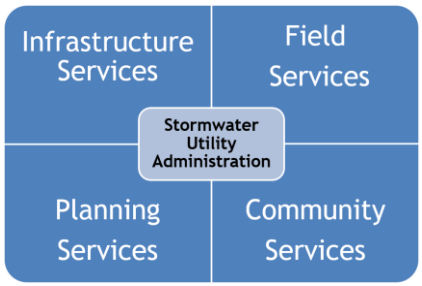
Public meetings and other means of outreach were pursued to notify the community of the proposed rate structure and fees, and a public hearing held. An Interlocal Agreement with Orange County was developed to allow the Orange County Property Tax Office to provide billing support. The associated fees will be included in property tax bills sent out in the summer of 2018.

1. Carrboro's Stormwater Management Program

The purpose of this section is to describe the expansion of Carrboro's stormwater management program that is enabled by the forming Stormwater Utility; the Town's stormwater program through mid 2018 is described in more detail in Appendix 1. The Utility will allow Carrboro to better address current regulatory requirements, prepare for potential future requirements, and in general expand stream and watershed protection and restoration initiatives, support for property owners with flooding and drainage related impacts, and maintenance and enhancements of stormwater infrastructure.

1.1 Program Structure

Carrboro's stormwater program can be described and broken down in different ways, one of which is based on the services that the program offers (see graphic, and Table 1). It is important to consider these services not as discrete and separate, but as integrated and coordinated, as facilitated by the administrative role. The placing of the program under the umbrella of a utility and within a dedicated enterprise fund results in the ability to more holistically manage and coordinate the Town's stormwater program.



Stormwater Utility Administration – includes developing and implementing program service delivery; stormwater related data management; regulatory tracking and annual reporting; issuing notice of violations; contract administration for contractual services; staffing the Stormwater Advisory Commission; program integration with Town administrative activities (e.g., operating budget and CIP).

Stormwater Infrastructure Services – include maintenance of Town-owned stormwater system including inlets, catch basins, pipes, ditches, and Stormwater Control Measures (SCMs); street sweeping; design and construction of public stormwater infrastructure (including "green" infrastructure) projects, stormwater retrofits, and restoration projects on Town maintained land.

Stormwater Planning Services – include planning and engineering review and oversight of new development proposals and construction, and updating of the Land Use Ordinance.

Stormwater Community Services – includes education and outreach, providing public participation opportunities, coordination with the Clean Water Education Partnership (CWEP), and creating and implementing a drainage assistance program.

Stormwater Field Services – include inspections of SCMs issued under a Town land use permit, illicit discharge detection and elimination activities, stream determinations, and stream monitoring.

Table 1: Administration of Stormwater Services Prior to and With the New Stormwater Utility

Stormwater Service	Prior to Utility	With Utility
Administration		
Legal	LUO (Article XVI) and illicit discharge (Town Code)	Legal structure for Utility added in Town Code.
Programmatic	Dispersed program	Umbrella program
Financial	Stormwater expenses not tracked	Tracked, under Enterprise Fund
Regulatory Responsibility	Planning (town wide), Public Works (PW facility)	Stormwater Utility
Advisory Commission	EAB	Stormwater Commission
Infrastructure		
MS4[1] and facility maintenance	Public Works	Public Works: support from Stormwater Utility
Green infrastructure	Not applicable	Stormwater Utility
Field	Planning Department	Stormwater Utility
Planning		
Plan review, erosion control, permitting	Planning Department: contract engineering & county support	Planning Department: Stormwater Utility, contract engineering & county support
SCM Inspection & maintenance[2]	Planning Department	Stormwater Utility (potentially with contract support)
Community		
Drainage assistance	Not applicable	Stormwater Utility
Outreach/education	Planning Department	Stormwater Utility

All of these services are important for the stormwater utility moving forward. In 2018, the priority is on establishing the administrative capacity and mechanisms to operate a successful utility over the long term. The rate structure presented in this report has been a major emphasis.

1.2 Program Challenges

1.2.1 Limited Funding/Capacity

The fundamental stormwater management challenge currently facing the Town is the absence of sufficient and dedicated funding; stormwater related activities currently compete with all Town functions provided for through General Fund revenues. One ramification has been limited staff capacity. Recognizing this, the Town created a Stormwater Enterprise Fund and the legal foundation for a Stormwater Utility, and hired a Stormwater Utility Manager in 2017. Currently, this fund is not receiving a separate/dedicated revenue stream. The creation of the new Stormwater Utility Manager position is a very positive step, but additional

[1] Municipal separate storm sewer system
[2] This item refers to stormwater control measure inspection and maintenance on private property after development (post construction).

staff will be required in the future given the amount and diversity of work involved in implementing a comprehensive stormwater program (see Tables 2 and 3).

Table 2: Summary of Town Staff Current Major Stormwater Responsibilities

Type of Service	Specific Responsibility	Notes
Administrative	Launching utility	Following up on this study; community input; creating and implementing interlocal billing agreement
	Stormwater related databases	GIS and administrative databases
	NPDES permit administration	Compliance activities, tracking and annual reporting
	Jordan Lake Rules	Compliance tracking, planning, implementation, reporting
	Town administrative tasks	e.g. financial, legal, contractual, cross department coordination
	Contract administration	e.g., benthic monitoring; Public Works facility permit compliance; engineering services
Infrastructure	Stormwater conveyance system	Maintaining catch basins, pipes, ditches, swales and proper disposal of waste from clean-up operations
	Street sweeping	Town operates one vacuum truck
	Public Works facility NPDES permit	The regulatory compliance aspect has received contract support.
Planning	Reviewing stormwater plans for new development proposals	Shared by staff and contract engineering firms
	Stormwater Control Measure inspections	Currently able to only pursue reactively
	Erosion control	Delegated to Orange County; some staff administrative time for coordination
Field	Implementing buffer requirements in LUO	Town's requirements exceed minimum state requirements, which adds to staff workload.
	Illicit discharge detection	Currently able to only pursue reactively
Community	Private property drainage inquiries	Tracking and providing support with floodplain administration, maintenance of public conveyance system
	Staffing new Stormwater Advisory Commission	Initiated in February, 2018
	Education and outreach	Participation in the Clean Water Education Partnership

As one means of assessing the Town's stormwater capacity, information from the two neighboring jurisdictions that are the most similar to Carrboro in many respects, Chapel Hill and Hillsborough, has been pulled together (Table 3). Chapel Hill has $2.8M and 16 stormwater staff positions and Hillsborough, with about a third of Carrboro's population and three quarters of the geographic footprint, has two full time stormwater staff positions and one Public Works position funded from their Stormwater Enterprise Fund.

The similarities shared by these towns includes both comparative size, proximity, demographics, etc., but also their status as Phase II NPDES communities[3] and location in the Jordan and Falls Lake watersheds, and by reference, associated regulatory requirements. Chapel Hill also shares in participation in the Bolin Creek Watershed Restoration Team with Carrboro.

Utilizing contractor services has been and will likely continue to be a cost effective way to complete some tasks without adding additional staff. The largest stormwater related contractual services historically have been for engineering services. The Town has also contracted for benthic monitoring support for the past 15 years, and for support with NPDES permit compliance for the Public Works facility and some infrastructure maintenance. New contractual services, e.g., for retrofit projects and perhaps other planned activities such as new monitoring and other field work, laboratory analyses, community outreach, additional infrastructure maintenance, support with impervious surface GIS data, and other special studies are all worth considering. With all contracting, Town staff must have time to administer contracts and supervise work, which is another reason why the stormwater program needs additional staff.

As a specific step forward to address the need for expanded capacity, it is recommended that a Stormwater Specialist position be planned for. The Stormwater Specialist position would provide support with: illicit discharge and pollution prevention and good housekeeping components of NPDES permits; SCM inspections and maintenance program; stormwater infrastructure and impervious surface GIS and utility billing data maintenance; supporting outreach and education efforts; completing stream determinations for new development proposals within the Town's delegated stream buffer authority and wetlands delineations; and helping initiate a Drainage Assistance Program. The position would support the Stormwater Utility Manager, Public Works Superintendent, and other staff with these and other stormwater management responsibilities.

[3] The Phase II designation refers to small municipalities, generally with a population between 10k and 100k, and a population density of at least 1000/square mile. NPDES refers to "National Pollution Discharge Elimination System" under the federal Clean Water Act.

Table 3: Comparison of Carrboro, Chapel Hill and Hillsborough Current Stormwater Utility Capacity

	Carrboro	Chapel Hill	Hillsborough
Utility Established	In process	2004	2016
Population	21,265	59,246	6,568
Area in Town (sq. miles)	6.46	21.12	5.33
Utility Annual Revenue (approx.)	TBD[4]	$2.8M	$600k
Dedicated Staff			
Stormwater Manager	1		1
Engineer	*	4	
Stormwater Specialist		1	1
Stormwater Analyst		1	
Environmental Educator		1	
Stormwater Billing Technician		1	
Mosquito Control Officer		1	
Public Works staff[5]		7	1
Total	1*	16	3

*See footnote[6]

1.2.2 Regulatory Requirements

NPDES Phase II Permits

The Town is regulated under two NPDES Phase II stormwater permits, one that is town wide and one for the Public Works facility.[7] Areas of needed performance improvement during this permit cycle are summarized in Table 4. While all of the six minimum measures required in the town wide permit are being implemented to a certain degree, the illicit discharge and post-construction stormwater programs have been implemented more reactively rather than proactively. For instance, the illicit discharge program is supposed to include preventative and proactive measures such as determining high hazard areas and completing routine inspections of these areas. The post-construction stormwater program includes review of stormwater management for development projects. It also requires inspection of SCMs; there are approximately 200 in Carrboro (Table 5). That is in addition to the requirement that the SCM owner inspect and submit a report at least annually to the Town for review. Creation of the Stormwater Utility Manager position provides some additional capacity for inspections and overseeing this program, but given the other responsibilities of the position, additional staff will be needed to fully meet this regulatory requirement.

[4] ~$850k is the projected annual revenue for the recommended rate structure presented in this report. It is designed to support both operating and capital expenses, including a capital reserve.
[5] Maintenance Supervisor, Street Cleaning Crew Supervisor, Heavy Equipment Operator, Construction Worker
[6] Carrboro does not have an engineer on staff, but uses contracting engineering services. It is estimated that the Town is currently using close to 1 FTE of contract engineering support for stormwater, although some of this is reimbursed from applicants for land use permits.
[7] In March, 2017, the town wide permit was renewed, and the Public Works permit will be reissued later in 2018.

Table 4: NPDES Permit New Activities

New Activity	Notes
Administrative: annual analysis of the capital and operation and maintenance expenditures and staff resources for stormwater; potential for new annual reporting requirements and goal to create a high quality, community oriented annual report.	Additional staff time needed.
Public Education, Outreach and Public Participation: renewed permit requires more extensive outreach and participation program.	Additional staff time may be needed.
Illicit Discharge Detection and Elimination: detect dry weather flows; employee training; improved public reporting mechanism; procedures to identify and eliminate failed septic systems; Enforcement Response Plan (ERP); enforcement tracking	Additional staff time needed.
Post Construction Runoff Control: More detailed inventory of post-construction structural stormwater control measures; recordation of maintenance responsibility; fully implement program for long-term operation and maintenance of structural BMPs, including verification of maintenance and inspections; provide educational materials and training for developers; more fully implement Enforcement Response Plan (ERP), including recordkeeping and follow-up associated with enforcement actions.	Significant additional staff time or contract resources needed.[8]

Table 5: Summary of Current Structural Stormwater Control Measures in Carrboro

SCM Type	Number	Ownership	Number
Dry detention (flooding)	64	HOAs	55
Bioretention (aka rain garden; water quality)	50	CHCCS	32
Ponds (both flooding, water quality)	19	Other (mix of commercial, multifamily, public)	83
Other (e.g., wetlands, cisterns, underground devices)	37		

Jordan Lake Rules

As with the Town's NPDES permit, compliance with the Jordan Lake rules is regulatory in nature, however, the future requirements, costs, and timing of regulatory compliance has been more difficult to plan for in the past five years due to changes in State legislation. The rules could require unprecedented reduction of nitrogen and phosphorous in stormwater runoff from existing development. While the cost of the new development Jordan Lake stormwater rules is born primarily by the development community, the existing development stormwater requirements are solely the responsibility of the Town to implement. While there is some uncertainty, staff have been preparing for Stage 1 of the existing development rules, and have programmed over $4M in the Town's Capital Improvement Program. Stage 2 requirements have not been

[8] Implementation of maintenance program to date based on landowner responsibility, with Town inspections, and legal authority to take over maintenance if neglected.

determined, but could result in additional expenses beyond Stage 1.[9] Retrofit projects have other benefits as well, such as improvement in local stream quality and reduced flooding impacts. Some level of pursuit of these projects is therefore recommended regardless of the future of Jordan Lake Rules. At a minimum, staff time is needed to continue to prepare the Town for potential implementation of the Jordan Lake Rules. Finally, in 2017, TJCOG, with participation by a broad stakeholder group, initiated exploration of regional collaboration. Involvement with this effort could require additional staff time in the future.

Bolin Creek Watershed Restoration[10]

Carrboro staff worked with Chapel Hill and other local, state and federal agency staff in 2006 to create the Bolin Creek Watershed Restoration Team (BCWRT) because Bolin Creek has been on the list of state and federal impaired waterbodies. At the time, the Bolin Creek watershed was selected as one of only 7 watersheds in the state to receive focused state and federal assistance in preparing grant applications and leveraging other resources, with a goal of improving water quality and removing Bolin Creek from the impaired waters list. This is an ambitious goal that will require a robust commitment for many years to come. To date, the progress that has been made has been grant supported, with little activity for the past 5 years. Available grant funding is currently very limited and competitive, and even with grant support, matching funds, in kind support, and staff capacity is needed. It is important to recognize that participation in the BCWRT is fulfilling a regulatory obligation since Bolin Creek has been identified as an impaired waterbody.

1.3 Program Opportunities

The new Stormwater Utility and Stormwater Enterprise Fund create the following opportunities:

1) Better protection and restoration of local creeks and downstream receiving waters, including Jordan Lake
2) Expansion of green infrastructure which provides multiple environmental and community benefits
3) Better service delivery to the community, including support to property owners experiencing impacts related to flooding and drainage.

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[9] The Town's eventual mandatory requirements and associated costs for implementation under the Jordan Lake Existing Development rule is a complex regulatory matter that has become more complex with legislative actions in the past several years. It is the Stormwater Utility Manager's recommendation that the Town take this rule seriously regardless of state legislative action. The need for water quality restoration in Jordan Lake has been studied and debated for over 4 decades, and the Jordan Lake Rules adopted in 2009 were the result of a long scientific and engineering analysis and stakeholder process. Importantly, there is also a federal TMDL for the lake; EPA has the ability to intervene if it deems that State level action is insufficient.

[10] Additional information on the Bolin Creek Watershed Restoration Team is available at http://www.townofcarrboro.org/280/Bolin-Creek-Watershed-Restoration

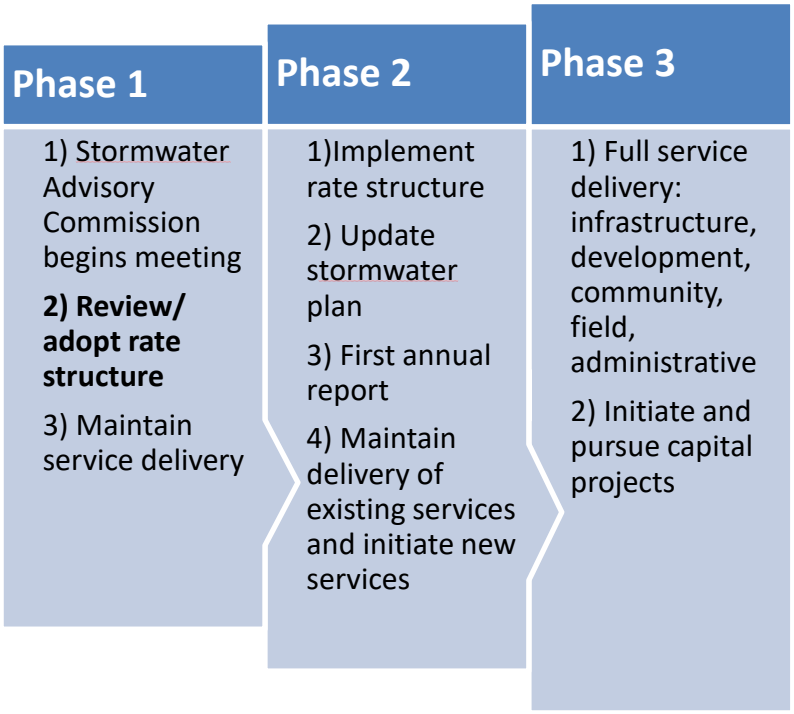
4) Better mechanisms and opportunities for community input into and support with stormwater management, in part through the new Stormwater Advisory Commission, and in part through a consolidated program with more capacity.

This report discusses these opportunities to some extent. Further articulation and exploration of these opportunities and identification of new opportunities will be possible once the utility is established and fully operational.

1.4 Five Year Plan for Expansion of Services

A five year programmatic plan is needed to guide cost projections, which in turn informs the new rate structure. This plan is summarized in Table 6, and corresponds to the following phases:

Figure 1: Moving from Utility Establishment to Operation



Phase 1 is currently underway, and is a largely administrative phase related to the establishment of the Utility. Until it is complete, Carrboro's stormwater program revenue will continue to originate from property taxes and pass through the General Fund.

Phase 2 will begin as soon as a rate structure and Interlocal Agreement for billing are in place, and marks a transition from Utility establishment to Utility operation. During this transition, some continuing and new administrative activities will be required. Revenue from new fees will begin to flow into the Enterprise Fund, and service delivery for new services will begin.

Phase 3 is the fully operational stage of the Utility. The administrative pieces will be fully established, and the Utility will be able to fully delivery a range of services. Achieving this stage in a timely fashion is desirable not only from a programmatic and community perspective, but also to be well prepared for implementation of Jordan Lake Rules, which are scheduled for review within this time frame, and for demonstrating compliance with the NPDES permit and progress with Bolin Creek watershed restoration. During Phase 3, projects programmed in the Capital Improvements Plan will begin to be implemented.

The following thoughts are important to highlight in considering the five year stormwater utility program plan presented in Table 6:

1) An important milestone on which the overall schedule hinges is the adoption of a rate structure and Interlocal Agreement for billing. As discussed elsewhere in this report, if either of these activities is not completed by June, 2018, the dedicated stormwater revenue stream will not be in place and the schedule and program activities could in large part be delayed by a year.
2) Similarly, hiring a Stormwater Specialist is a prerequisite for fully pursuing many if not all of the Phases 2 and 3 activities.

1.5 Stormwater Advisory Commission

Part of the new stormwater program structure is a new Stormwater Advisory Commission to assist with creating and implementing the stormwater utility. Appointments were made to the Commission in January, and the Commission began meeting in February. This study has been referred to the Commission for review. Staffing the Commission and pursuing outreach related to the findings and implications of this study could be the major emphasis of the Stormwater Utility Manager in the first half of 2018 (and beyond if more work is needed to finalize the rate structure).

Table 6: Stormwater Utility Recommended Plan for Phasing in of New Services*

	Phase 1		Phase 2	Phase 3
Service	**1.1 2017**	**1.2 January-June 2018**	**July 2018-2019**	**2020- 2022**
Administrative	Town Code adopted (Stormwater Utility; Enterprise Fund). Stormwater Commission formed. Stormwater Utility Manager hired. Initiated tracking of stormwater expenses.	Stormwater Advisory Commission begins meeting. Rate structure developed and adopted. Interlocal Agreement with County for billing.	Stormwater Specialist hired. Stormwater Plan updated. First annual report to community. Billing and revenue collection from fees begins. Regulatory annual reporting. Drainage assistance policy adopted.	Jordan Lake Rules implementation anticipated NPDES permit reissued (2022) Bolin Creek Watershed Restoration Plan revisited.
Community	Pre 2017 efforts continue	Pre 2017 efforts continue	Drainage assistance program begins. Local public education/ outreach program initiated.	Drainage assistance program expands. Public education/outreach program expands
Infrastructure	Pre 2017 efforts continue	Pre 2017 efforts continue	Enhanced maintenance/repair and green infrastructure opportunities identified.	Stormwater retrofit/capital projects program begins
Planning	Pre 2017 efforts continue	Pre 2017 efforts continue	Review stormwater provisions in LUO.	Implement any changes identified.
Field	Pre 2017 efforts continue	Pre 2017 efforts continue	Post construction maintenance and inspection program expansion.	Post construction maintenance and inspection program fully implemented

*the timing assumes that a rate structure is adopted in FY 17/18.

2. Stormwater Management Cost Projections

2.1 Introduction

North Carolina legislation allows municipalities to charge a stormwater fee that covers only those expenditures related to the stormwater program. To determine the amount of money needed, it is essential to identify relevant current and expected stormwater expenses, and to also not include expenses that are more appropriately assigned to other Town budget accounts. Examples of stormwater specific costs include items such as: stormwater plan review for new development, inspections of stormwater control measures, illicit discharge investigations, street sweeping, maintenance of stormwater infrastructure, and stormwater capital improvement projects.

A very preliminary three year budget was created for the utility in 2017 to supplement the adoption of the legal foundation in the Town Code and the FY 2017/2018 Town Operating Budget (Table 7). The basic strategy for that estimate was to focus efforts in FY 17/18 on getting the administrative structure established, transition into collecting new revenue through fees and operating the utility in FY 18/19 in; and begin implementation of capital projects in FY 19/20. Over the past five years, the Capital Improvements Program has been identifying stormwater capital projects. The CIP was most recently updated in January, 2018, and includes a 5 year plan for stormwater projects, with a need for additional projects recognized beyond this planning horizon.

Table 7: Three Year Stormwater Program Budget Presented in June, 2017

	Year 1 FY 2017-18	**Year 2 FY 2018-19**	**Year 2 FY 2019-20**
Revenues			
Stormwater Fees	- 0 -	$430,000	$430,000
Transfer from G. F.	$308,383	$213,658	$224,531
Total Revenues	$308,383	$643,658	$654,531
Expenses			
Personnel	$105,383	$192,797	$196,653
Operating	$203,000	$450,861	$457,878
Total Expenses	$308,383	$643,658	$654,531

2.2 Cost Projections

From the above discussion and supporting information in this document, a five year stormwater program cost projection has been developed, using the following foundation.

1. Capture all known current operational stormwater related expenses. (In FY 17/18, Town staff began tracking stormwater specific expenses. Year to date reports were run as input into annual estimates).
2. Capture new operational expenses associated with better service for existing stormwater regulatory requirements and plan for new/potential stormwater regulatory requirements;
3. Plan for future stormwater capital projects and enhanced infrastructure maintenance, repair, and replacement;
4. Minimize administrative burden/overhead and maximize delivery of services and environmental enhancement;
5. Collect sufficient revenue to minimize future needs for rapid or significant increases in fees, and address future capital needs.
6. As discussed above, a new Stormwater Specialist staff position is recommended to provide support with delivery of services;
7. It is anticipated that approximately 3 miles of new town-maintained streets and conveyance and 20 SCMs on private property will be added due to new development during the five year period
8. The Town currently owns 6 SCMs but is planning to construct more at MLK and Anderson Park. Projections reflect both the capital costs and the expected increase in maintenance.
9. The Town has an adopted Drainage Policy. There is interest in revising this policy and establishing a new Drainage Assistance Program that could include cost sharing.
10. The projections have been used to identify revenue needed, but have not tried to discriminate between revenue funds made available through the new Enterprise Fund and the General Fund.

It is important to note that the cost projections presented are "best current estimates", but are not intended for final budgetary use or as firm or fixed values. The main purpose of these estimates is to provide guidance in the determination of the rates needed to deliver the desired services. The expense amounts and timing, based on future and more detailed financial analysis, can and should change as specific inputs for future operating and capital budgeting as the Utility transitions from a formative to fully operational status.

The five year financial estimates are summarized in Table 8, and the following points are offered for the line items:

1) The estimates assume that a new Stormwater Specialist position is hired in December, 2018. Personnel expenses are also allocated to all service categories, with amounts varying by year. There is a shifting of allocation from more administrative time to more non-administrative time during the five year window. Non-personnel administrative expenses cover a range of items including but not restricted to dues, training, conferences, routine office expenses/supplies, vehicle use, and legal, and contractual services.
2) The Infrastructure estimates cover routine stormwater system maintenance, repairs, retrofits, street sweeping, green infrastructure, capital stormwater and stream restoration projects, and Public Works facility expenses.

3) The Planning estimates cover staff time and engineering services for development review, LUO updates, and construction oversight related to stormwater.
4) The Community estimates cover establishment of the Drainage Assistance Program and cost sharing, outreach and education, and Stormwater Advisory Commission budget.
5) The Field estimates cover SCM maintenance and inspection, benthic monitoring, stream repair materials, and cost sharing for stream gage maintenance
6) The recommended revenues from the rate structure creates a surplus to help fund capital expenses both within and beyond the 5 year window.

Table 8: Five Year Stormwater Program Cost Projection*

	FY 18/19	FY 19/20	FY 20/21	FY 21/22	FY 22/23
Administrative Services	$169,569	$141,805	$127,307	$133,743	$138,501
Infrastructure Services	$163,150	$246,090	$369,110	$551,535	$520,414
Planning Services	$67,650	$72,408	$74,286	$76,252	$78,309
Community Services	$38,650	$66,375	$92,860	$100,575	$108,436
Field Services	$30,650	$60,762	$57,439	$59,706	$61,569
Total	$469,670	$587,440	$721,003	$921,811	$907,229

*personnel costs are allocated amongst the 5 service categories, with the allocation varying by year. More administrative time is expected at the start of the 5 year period, and less at the end.

3. Fee Analysis and Recommended Rate Structure

> "Stormwater management utility shall mean an organizational structure established by the Town, that is responsible for funding, administering, and operating the Town's stormwater management program, and that is supported through a rate structure based on the impervious surface area and found on land parcels located within the town limits." *Carrboro Town Code Section 18-4*

3.1 Introduction

The above excerpt from the Town Code creates the fundamental basis for the work presented in this section. In Section 3.2, an analysis is presented that establishes the foundation for a recommended rate structure. In the Section 3.3, the recommended rate structure is presented, along with a discussion of the recommended approach to refine and improve the rate structure in future years as the utility matures, adds capacity, and is able to improve the information used to create the rate structure.

An overview of elements from the Town Code that are most relevant to the rate structure is presented in Table 9[11]. An important contextual premise is that the analysis and recommended rate structure assumes that the Town will choose to pursue a fee basis rather than a property tax basis, as generally provided for in the Town Code.

Table 9: Town Code Stormwater Utility Definitions

Town Code Section	Important Direction
18-3: Definitions	Includes over a dozen important definitions. For example, determines how to distinguish between residential and nonresidential parcels, provides specificity for the concept of impervious surface, and defines Equivalent Residential Unit (ERU) as a unit of comparison
18-4 Utility and Enterprise Fund	Establishes utility and dedicated stormwater funding; requires that revenue collected only be used for stormwater, and a Public Hearing be held prior to collecting revenue
18-5 Jurisdiction	Establishes the municipal limits as the area within which the Town can collect revenue
18-6 Rate structure (Reserved)	To be added after establishment of the rate structure
18-7 Schedule of fees and charges	Establishes that rates, fees, charges, and penalties apply to properties in municipal limits
18-9 Exemption and credits	Establishes the properties that are exempt from service charges; allows for establishment of a credit manual.

[11] The complete stormwater utility section of the Town Code is available at http://www.ci.carrboro.nc.us/DocumentCenter/View/4631

Given the Town's interest in social equity, it is important to point out that Section 18-9 (a) of the Town Code specifically places constraints on the ability of the rate structure to address social equity:

> **Town Code Section 18-9(a).** "Statement of policy. Except as provided in this section, no public or private property shall be exempt from stormwater management utility service charges or receive a credit or offset against such stormwater management utility service charges. No exemption or reduction in stormwater management utility service charges shall be granted based on the age, tax or economic status, race, or religion of the customer, or other condition unrelated to the cost of providing stormwater services and facilities."

The analysis and rate structure presented below is premised on the Town Code requirements. It also attempts to minimize the administrative burden of applying the structure, while remaining as equitable as possible to property owners.

There are three basic approaches currently being used by NC jurisdictions for a fee structure[12], in increasing order of administrative complexity and need for more precise imperviousness data:

1) Flat fee. A flat fee means that the same fee is applied to all properties, regardless of any variables such as differing amounts impervious surfaces;
2) Tiered fee. This approach identifies a series of different fees for different classes of properties. Most typically, this has been applied based on a range of impervious surface areas per class, with multiple and likely many parcels falling within each tier;
3) Per unit/parcel specific fees. This approach uses the ERU or a direct estimate of impervious surface area to assign a unique fee to each parcel.

To put these approaches into context for Carrboro, 4869 nonexempt parcels[13] have been identified to which a fee needs to be assigned, with imperviousness estimates by parcel ranging from 500 square feet to almost 600k square feet, or over two orders of magnitude. A single flat fee would have clear equity concerns by undercharging some and overcharging others. A tiered fee provides some middle ground, but still allows for some inequity within tier classes given the variability. A per unit fee is, hypothetically, the most equitable, but is administratively problematic due to the extra burden with developing sufficiently precise impervious surface data at a parcel scale, and an implementation burden with the effort needed to respond to questions and disputes about impervious surface estimates.

[12] This article by UNC's Environmental Finance Center further discusses these: http://efc.web.unc.edu/2017/04/27/state-stormwater-fees-north-carolina/

[13] This only includes properties using the 10 digit PIN. It does not include condominium properties (3 digit sub PIN)

A recurring common challenge faced by forming stormwater utilities is the significant administrative burden in determining parcel specific impervious surface estimates which are applied to calculate parcel specific fees, based on imperfect information. The rate structure that is adopted can contribute to or help alleviate this burden. With other types of public utilities, the service charge is based on metered usage. It is not practical to measure the quality and quantity of stormwater runoff from individual properties. Impervious surface area has emerged as the metric of choice for stormwater rate structures.

Based on over a decade of experience in Chapel Hill[14], more precise tracking of impervious surface on individual parcels would take a concerted study initially (either in house or contracted), and a significant amount of ongoing staff time to maintain. The combination of the imprecision of GIS data and Carrboro's dense development with small lots compounds the challenge. It is recommended that as much of the revenues generated by the Utility as possible go towards solving environmental problems and serving the community, rather than meticulous tracking of impervious surfaces at a small parcel scale. In the discussion and analysis that follows, a hybrid structure that utilizes a flat residential fee and nonresidential tiers is proposed, recognizing the opportunity to change this structure in the future as more accurate and precise GIS data is developed.

3.2 Analysis

This section begins with a discussion of assigning properties for inclusion in the utility ("non-exempt" properties) and as residential or non-residential, and concludes with an analysis of impervious surfaces.

[14] Chapel Hill has adopted a rate structure with 7 single family residential tiers, and a separate structure for condominiums and townhomes. Chapel Hill has a full time position dedicated to maintaining and administering the impervious and billing data. This does not include the billing itself, which is done by Orange County for about $50k/year.

3.2.1 Identifying Non-Exempt Properties

The first step in the analysis was to identify all parcels located in Carrboro. This was a straightforward GIS step that involved overlaying the municipal boundary on the parcel (property) data, and visually examining parcels along the edge of the boundary to make sure parcels were appropriately accounted for. The next step was to remove exempt parcels as defined in the Town Code. The first two items on the list of exempted properties (public transportation and railroad rights of way) were straightforward and required no special processing since the GIS parcel data does not include polygon features for them. Town-owned properties to remove from the parcel dataset were determined by a combination of text searching in the attribute information of the parcel data and visual examination of known Town property, including facilities, parks, and other properties. The third item required selecting and removing parcels with less than 500 sf of impervious surfaces. Removing the designated HOA parcels involved a visual examination and selection of HOA parcels to exempt using GIS zoning and stormwater polygonal and attribute data. The Parcel Identification Number (PIN) was used as the unique identifier for each parcel.

Properties Exempted from Stormwater Fee (from Town Code)

(1)Publically dedicated roads, streets, greenways, sidewalks and other publically dedicated rights- of-way and easements…. This exemption shall not apply to internal site roadways…..

(2) Railroad rights-of-way……

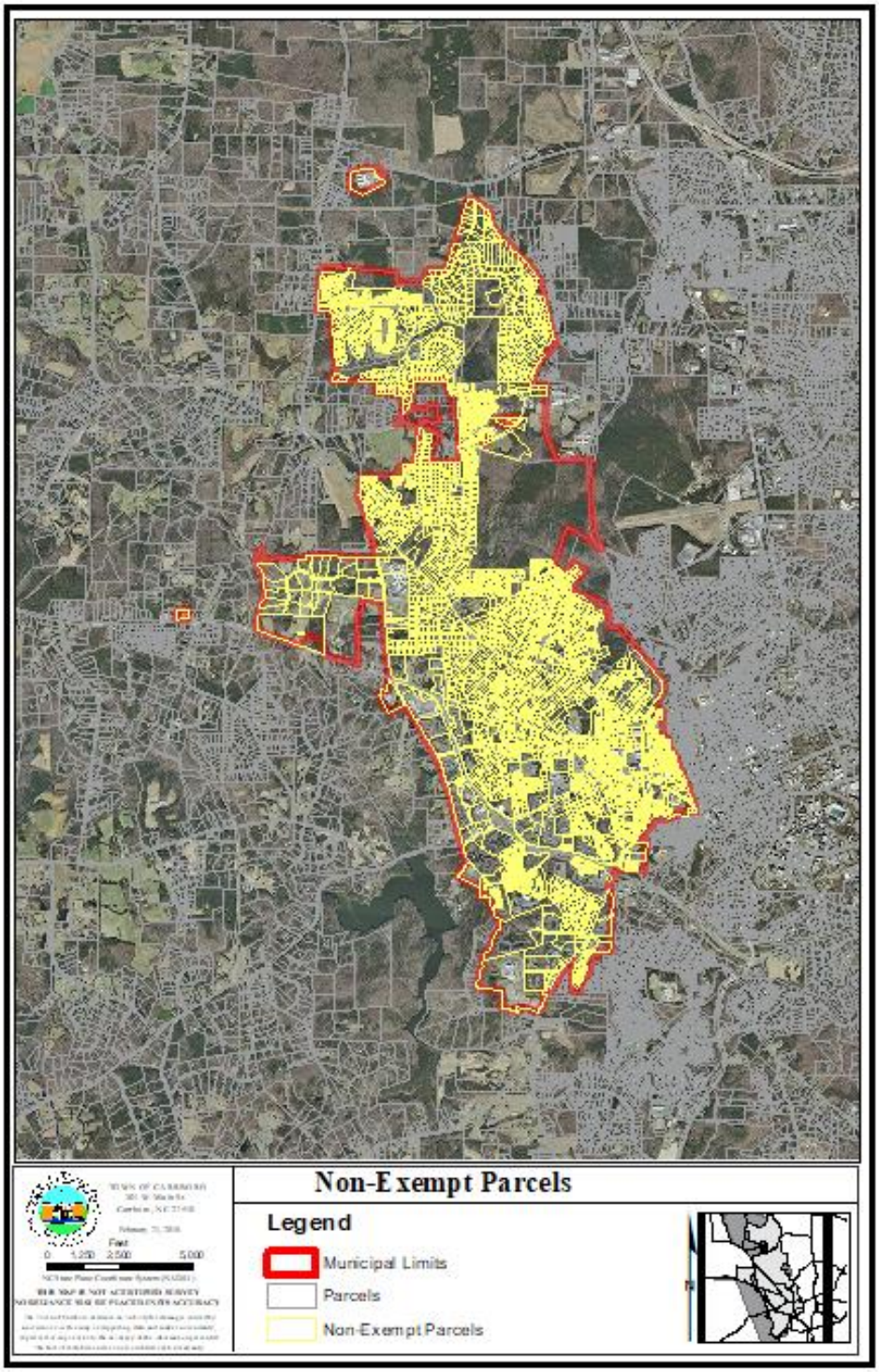
(3) Undeveloped land, open space or land parcels with fewer than 500 sf of impervious surface area.

(4) Parcels maintained by homeowner associations as undeveloped open space or with engineered stormwater control measures.

(5) Town-owned property.

Figure 2 is a map indicating all nonexempt parcels. Appendix 4 includes maps breaking this out for residential and non-residential parcels, as discussed in the next section.

Figure 2: Nonexempt Parcels Subject to Stormwater Fee



3.2.2 Assigning Properties as Residential or Nonresidential

As discussed in Appendix 3, stormwater utility fees in North Carolina are almost universally based on impervious surface area. The reasoning is that as impervious surface increases, more stormwater runoff is generated with a greater potential to carry more pollutants. The Town Code defines properties as being either residential or nonresidential for purposes of determining the applicable service charge (fee). It is important to note that "residential" specifically refers to single family/detached residences and multifamily/attached residences on separate parcels. "Nonresidential" refers to multifamily/attached residences on a single parcel and all other non-residential parcels.[15] There are many attached residences in Carrboro on separate parcels. A combination of parcel, planimetric, and zoning GIS data and visual scanning were used to assign all nonexempt parcels as either residential or nonresidential. For example, planimetric building attribute data includes information about the type of building. For much of the residential neighborhoods and downtown area of Carrboro, assigning properties into one of these two categories is straightforward and unambiguous. Making this assignment for the transitional commercial/residential areas in town required a more tedious parcel by parcel review of GIS data. Note that further break down nonresidential properties into tiers was pursued, as discussed below. Maps of residential and non-residential parcels are included in Appendix 4.

From Town Code:

Residential parcel shall mean a parcel with a single-family residential structure used as a single-family dwelling and whose primary uses is as a single-family residence; residential condominiums/townhomes subdivided as individual parcels are considered residential parcels.

Nonresidential parcel shall mean a parcel that is developed land not used as a single-family residence; this includes, but is not limited to, commercial, industrial, institutional properties, and apartment complexes.

[15] The lone exception is that, based on input from the Board of Aldermen in June, 2017, the analysis presented interprets duplexes (two unit attached residences) on a single parcel as "residential".

3.2.3 Impervious Surface Analysis

A GIS analysis of impervious surfaces was completed to support the creation of a rate structure. The analysis was guided by these general parameters and available data:

1) using parcel data provided by Orange County to identify parcels to include in the analysis, as discussed above;

2) using Town maintained GIS data (including planimetric data, results of a 2013 study of impervious surfaces in Carrboro, and the most recent orthophotography) to create an updated dataset of impervious surfaces.

Following on the assignment of parcels into two categories, two separate (but related) analyses were completed. The first was to calculate the "Equivalent Residential Unit" (ERU), which is the amount of square footage of impervious area associated with a small residential parcel. The second analysis involved separating the large residential/nonresidential parcels into distinct tiers for assignment of fees, based on the ERU.

As a matter of routine GIS database management, building footprint data for permitted buildings have been comprehensively and continuously updated as Carrboro's new development is built out.[16] There are other types of impervious surfaces such as parking lots, private roads, driveways, paths/sidewalks, recreational areas (e.g., tennis/basketball courts), patios, and unpermitted buildings.[17] A comprehensive analysis and GIS database creation of <u>all</u> impervious surfaces in Carrboro was completed in 2013. However, some types of impervious surface data are not being routinely maintained; some impervious surface changes since 2013 have therefore not been captured. For this study, where larger and obvious areas of imperviousness were observed, especially for larger nonresidential parcels, these areas were digitized and added to the impervious GIS dataset. However, it was beyond the scope of what was possible within time and resource constraints to attempt to more comprehensively update the impervious surface data.

Another detail for the impervious surface analysis is that permeable pavement designed and maintained per recognized specifications was not recognized as an impervious surface for the purposes of this study, but rather as a stormwater control measure. Its use in Carrboro is currently very limited.

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[16] A good GIS public streets, sidewalks, and greenways database is also available, however, this category of impervious surface data is exempted from the utility, and is therefore not relevant to this analysis.

[17] The 2013 impervious surface analysis did attempt to differentiate whether roads, parking lots, and driveways were paved or unpaved. For this rate study, the distinction between "paved" and "unpaved" was not considered to be an important one; these areas were all considered to contribute to the total impervious surface of a site. The surface treatment of these types of use areas is one factor affecting hydrology and runoff; the subsurface treatment is also very important. Typically, vehicular and bike/pedestrian facilities are graded and compacted to shed water rather than encourage infiltration. Often, impervious subgrade materials are imported. Use over time adds to compaction.

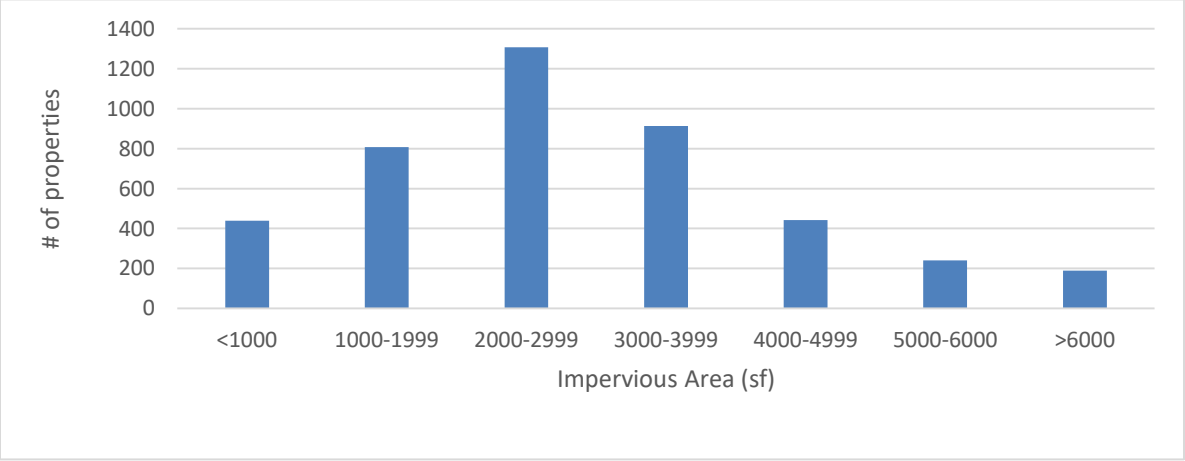
The accuracy and precision of both the impervious and property/parcel boundary GIS data is an important consideration in establishing rates, as further discussed in Section 3.4. Carrboro's (via Orange County) GIS parcel data does not have the "metes and bounds" accuracy and precision of surveying. Visual examination of GIS parcel boundary data during the analysis indicated that for some parcels, the parcel data appeared to represent the property boundary very accurately, but for other parcels, the depiction appears to be less accurate. Similarly, it appears that a high percentage of the impervious surface areas depicted for specific properties are relatively accurate, however, a small percentage are less accurate. This supports the recommendation that using impervious surface data for tiered residential or "per unit" assignment of nonresidential fees is not recommended at this time because of the current accuracy of parcel and impervious surface GIS data.

"...using impervious surface data for tiered residential or "per unit" assignment of nonresidential fees is not recommended at this time because of the current accuracy of parcel and impervious surface GIS data."

3.2.3.1 Residential Impervious Surface

Given a decision to recommend a flat residential fee, the extent of the analysis required for residential parcels was to overlay all the single family residential parcels on the impervious data. Median and mean values of 2710 and almost 3000 square feet were determined (Figure 3). The Town Code assigns a value of 2800 square to the ERU which is based on the value initially used while Hillsborough was recently creating their stormwater utility.[18]

Figure 3: Impervious Area for Residential Parcels

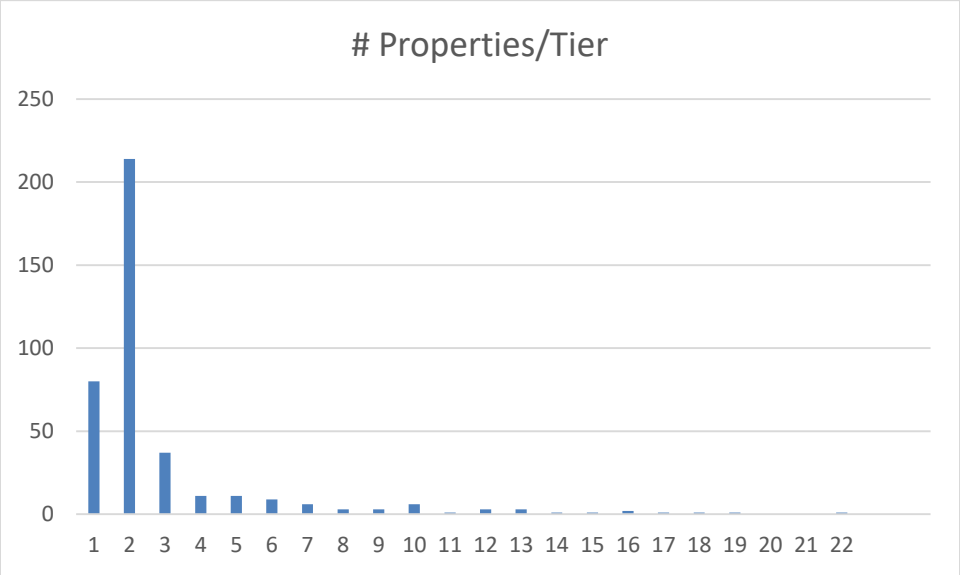


[18] 2455 square feet is another frequently referenced ERU value in NC (see the EFC section in the Appendix).

3.2.3.2 Non-residential Impervious Surface

For non-residential properties, staff used the nonresidential parcels and GIS impervious surface data discussed above to calculate the impervious area per parcel. As expected, a wide range of impervious area per parcel was identified. An important finding is that the distribution is notably asymmetrical with a long "tail" (Figure 4). A tier structure was chosen that identified breakpoints that balance the need for sufficient and meaningful resolution in the structure and the accuracy and precision of the GIS data that is available. These tiers were set up with smaller ranges of impervious area for property with less imperviousness, representing a large majority of the 313 nonresidential properties.

Figure 4: Impervious Area Tiers for Nonresidential Parcels



(Y axis is number of properties per tier, X axis shows tiers)

Table 10 summarizes the distribution of impervious area across nonresidential properties, and also assigns a total of 22 tiers to use for the rate structure. Based on the general distribution of data, with most nonresidential parcels being less than 2 acres, and the parcels with the most imperviousness having almost 600,000 square feet (about 13 acres) of imperviousness, it is recommended that this tiered structure for nonresidential properties be used. This approach balances considerations around: the accuracy of current data; administrative time with further impervious analysis and resolution of property level discrepancies, inquiries, and disputes; and providing as much equity as possible in the rate structure.

Table 10: # of Non-Residential Properties by Tier

	Impervious Area (sf)				
Tier	**Minimum**	**Maximum**	**Median**	**ERUs**	**# Properties**
1	500	5999	3250	1	80
2	6000	23999	15000	5	214
3	24000	41999	33000	11	37
4	42000	59999	51000	17	11
5	60000	89999	75000	25	11
6	90000	119999	105000	35	9
7	120000	149999	135000	45	6
8	150000	179999	165000	55	3
9	180000	209999	195000	65	3
10	210000	239999	225000	75	6
11	240000	269999	255000	85	1
12	270000	299999	285000	95	3
13	300000	329999	315000	105	3
14	330000	359999	345000	115	1
15	360000	389999	375000	125	1
16	390000	419999	405000	135	2
17	420000	449999	435000	145	1
18	450000	479999	465000	155	1
19	480000	509999	495000	165	1
20	510000	539999	525000	175	0
21	540000	569999	555000	185	0
22	570000	599999	585000	195	1

3.3 Recommended Rate Structure

Using the above discussion as a foundation, the recommended rate structure is provided below. It is proposed that there will be a flat fee for all residential properties during the first year of implementation, and that a process be simultaneously pursued to improve the data to allow for residential tiers to be added in future years. It is important to note that the Town Code provides for (and a process will be established as an implementation step) to allow property owners to request a review of their calculated impervious surface and associated fee. The addition of tiers in the residential structure will add substantially to the administrative burden because of the time spent resolving disputed assignment of residential fees. This conclusion has been reached both through the review of the available parcel and impervious data as well as conferring with other local government stormwater utility staff. In the future, the Town should consider two or more residential tiers, but doing so is not recommended as the utility is starting up due to the administrative burden that would result due mainly to the current accuracy and precision of available GIS data. For nonresidential properties, a tiered structure will allow for a more flexible and equitable fee assignment. This structure makes more sense for these properties that are substantially larger and have considerably more impervious surface, both per parcel and collectively. The larger parcel size also results in generally better data for calculating parcel level imperviousness. The limited staff time available would be better spent resolving impervious surface calculations for this much smaller number of properties with much more impervious surface than for residential properties.

It is proposed that there will be one flat fee for residential properties.

For nonresidential properties, a tiered structure will allow for a more flexible and equitable fee assignment.

To determine the recommended fee amounts, the five year cost projections and future capital needs were compared to expected revenue for various rate amounts. Fees set by other municipalities, and especially municipalities in the Jordan and Falls Lakes' watersheds, were used as a secondary consideration for determining the recommended structure (see Appendix 3). The proposed fee is about at the 75th percentile compared to fees for all other North Carolina municipalities, and close to the median when compared just to municipalities in the Upper New Hope arm of Jordan and Falls Lake watersheds.

Based on the direction from the Town Code, the discussion and analysis presented above (including the 5 year projection of expenses and impervious surface analysis) as well as a comparison of rates in other jurisdictions (Appendix 3), the following stormwater utility service charges/fees are proposed:

Table 11: Recommended Rate Structure

(Annual Service Charge/Fee)

Residential (1 ERU).....$75
Non-residential:
Tier 1 (1 ERU)..... $75
Tier 2 (5 ERUs)..... $375
Tier 3 (11 ERUs) $825
Tier 4 (17 ERUs) $1275
Tier 5 (25 ERUs) $1875
Additional Tiers (+10 ERUs)*….add $750 from the immediately adjacent lower tier

*in 10 ERU increments, price per tier, total of 22 tiers. The largest tier has 195 ERUs. The annual fee for this tier is $14,625. A table showing all 22 non-residential tiers is provided in Table 12.

This rate structure is recommended based on an assessment of the annual operational needs to provide comprehensive service delivery, and to also have a surplus to address future capital projects, currently estimated at over $4M. From a historical perspective, the Town has been operating its stormwater program for over a decade with an annual budget estimated at $200k-$300k, and no capital reserves. For strictly meeting operating (and not capital) needs, the current annual budget needed to both more fully addresses regulatory requirements but also increases service delivery and infrastructure maintenance is projected to be about $500k. The recommended rate structure is projected to create an annual revenue stream of about $800k, or about $300k of surplus per year that can be used for both/either further enhancements in service delivery and/or creating a capital reserve.

Table 12: Complete Non-Residential Rate Structure

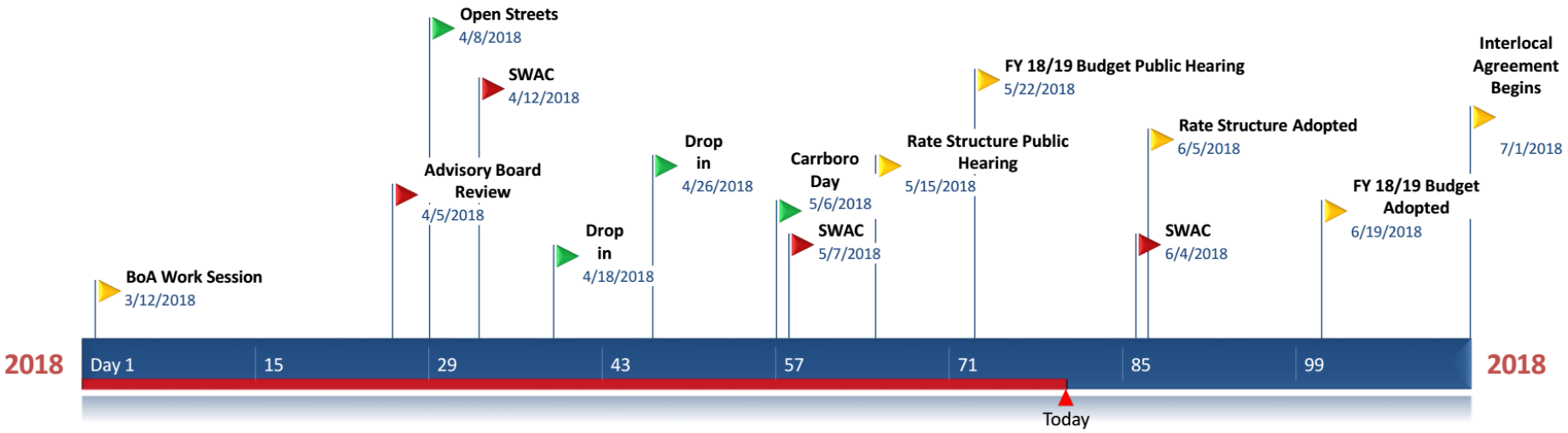
Tier	Minimum IS	Maximum IS	Median IS	ERUs	Fee	# of Properties
1	500	5,999	3,250	1	$75	80
2	6,000	23,999	15,000	5	$375	214
3	24,000	41,999	33,000	11	$825	37
4	42,000	59,999	51,000	17	$1,275	11
5	60,000	89,999	75,000	25	$1,875	11
6	90,000	119,999	105,000	35	$2,625	9
7	120,000	149,999	135,000	45	$3,375	6
8	150,000	179,999	165,000	55	$4,125	3
9	180,000	209,999	195,000	65	$4,875	3
10	210,000	239,999	225,000	75	$5,625	6
11	240,000	269,999	255,000	85	$6,375	1
12	270,000	299,999	285,000	95	$7,125	3
13	300,000	329,999	315,000	105	$7,875	3
14	330,000	359,999	345,000	115	$8,625	1
15	360,000	389,999	375,000	125	$9,375	1
16	390,000	419,999	405,000	135	$10,125	2
17	420,000	449,999	435,000	145	$10,875	1
18	450,000	479,999	465,000	155	$11,625	1
19	480,000	509,999	495,000	165	$12,375	1
20	510,000	539,999	525,000	175	$13,125	0
21	540,000	569,999	555,000	185	$13,875	0
22	570,000	599,999	585,000	195	$14,625	1

4. Implementation Process

The drafting of this report is just one step in adopting a rate structure. A recommended process and timeline is provided in Figure 5. In the spring of 2018, this study and a draft rate structure have been presented to the Stormwater Advisory Commission, other advisory boards, and to the community prior to a Public Hearing. The document and rate structure will be finalized based on the input received. Additional outreach materials have been prepared, and a community engagement process pursued. A public hearing has been scheduled for May 15th to formally receive public input on the fee/rate structure (this is a statutory requirement). In the late spring of 2018, the Board of Aldermen officially adopted a rate structure/fee schedule and approved an Interlocal Agreement with Orange County to provide billing and collection. Town staff will provide data to the Orange County tax office to be sent out on tax bills due

between September 2018 and January 2020. Other administrative actions will be needed after the rate structure is adopted to facilitate the transition to a fully operating utility. Examples include administrative procedures to handle disputed fees. It may also be desirable to create a procedure and manual to provide for crediting for nonresidential properties with Stormwater Control Measures that treat stormwater, along with a fee assistance program and procedure for seeking assistance.

Figure 5: Stormwater Rate Structure Outreach and Establishment Schedule



Appendices

Appendix 1: Glossary…….34

Appendix 2. Carrboro's Current Stormwater Management Program……..36

Appendix 3: Stormwater Utility Fees in NC (From UNC-EFC)……48

Appendix 4: Maps of Non-Exempt Parcels……..61

Appendix 5: Table of Potential Capital Projects/Retrofits…….……..63

Appendix 6: FAQs …….64

Appendix 7: Links to additional information……..70

Appendix 1 Glossary

Capital Improvements Program is the five year plan which identifies capital projects and equipment purchases, provides a planning schedule and identifies options for financing the plan.

Equivalent Residential Unit (ERU) is a typical unit used to assess stormwater fees and is equivalent to the average impervious surface area of a single family residential parcel within a given jurisdiction. Non-residential properties are often converted to a specific number of ERUs based on their size for billing purposes. For example, if a utility determines their ERU area is 2,000 square feet, a business with 20,000 square feet of impervious service would be billed for 10 ERUs

Green Infrastructure is an approach to managing stormwater that provides many environmental and community benefits. While single-purpose gray stormwater infrastructure—conventional piped and ditched drainage—is designed to move urban stormwater away from the built environment, green infrastructure reduces and treats stormwater at its source, recognizes water as a resource rather than waste product, and enhances the built environment.

Illicit Discharge is any discharge to an MS4 that is not composed entirely of stormwater, with some exceptions such as discharges from fire-fighting activities.

Impervious Surface refers to the areas of a site that do not allow water to infiltrate into the soil. These surfaces contribute to increased amount and velocity of runoff. The water picks up sediment and pollution, such as spilled automobile fluids, before making its way to stormwater drains, and ultimately directly into surface waters.

Municipal Separate Storm Sewer System (MS4) is the conveyance system operated by a public entity that captures stormwater runoff for discharge.

National Pollution Discharge Elimination System (NPDES) is the permit program of the Environmental Protection Agency which regulates discharge into waters of the United States. Certain municipalities must apply for (and receive) a NPDES permit in order to operate an MS4. These NPDES permits are categorized as Phase I or Phase II. There are six Phase I and 105 Phase II MS4s in North Carolina.

Stormwater Control Measure (SCMs) are physical structures requiring engineering design and construction to remove pollutants from stormwater runoff. They also provide flood control, reduce downstream erosion, promote groundwater recharge, and help meet local and State legislative requirements. For many years, SCMs were referred to as “BMPs”.

Stormwater Credit is an ongoing reduction in a property's normally calculated stormwater fee given for certain qualifying activities that reduce the impact of increased stormwater runoff resulting from development, or provide an ongoing public benefit related to stormwater management.

Stormwater Enterprise Fund is considered a best practice to promote and maintain long-term financial sustainability for stormwater activities. Its purpose is the dedication and protection of funding applicable to the responsibilities of a stormwater management utility including, but not limited to, rents, rates, fees, charges, and penalties.

Stormwater Fee is a stormwater management service charge, applicable to a land parcel, which generally reflects the impact on or demand for stormwater management services provided by a local government to properly control and manage stormwater runoff quantity and/or quality associated with the land parcel. The fee can vary, typically based on the amount of impervious surface.

Stormwater Utility is the organizational structure established by a local government that is responsible for funding, administering, and operating the stormwater management program, and that is supported through a rate structure based on the local conditions (e.g., impervious surface) found on land parcels located within the municipal limits.

Appendix 2. Carrboro's Current Stormwater Management Program

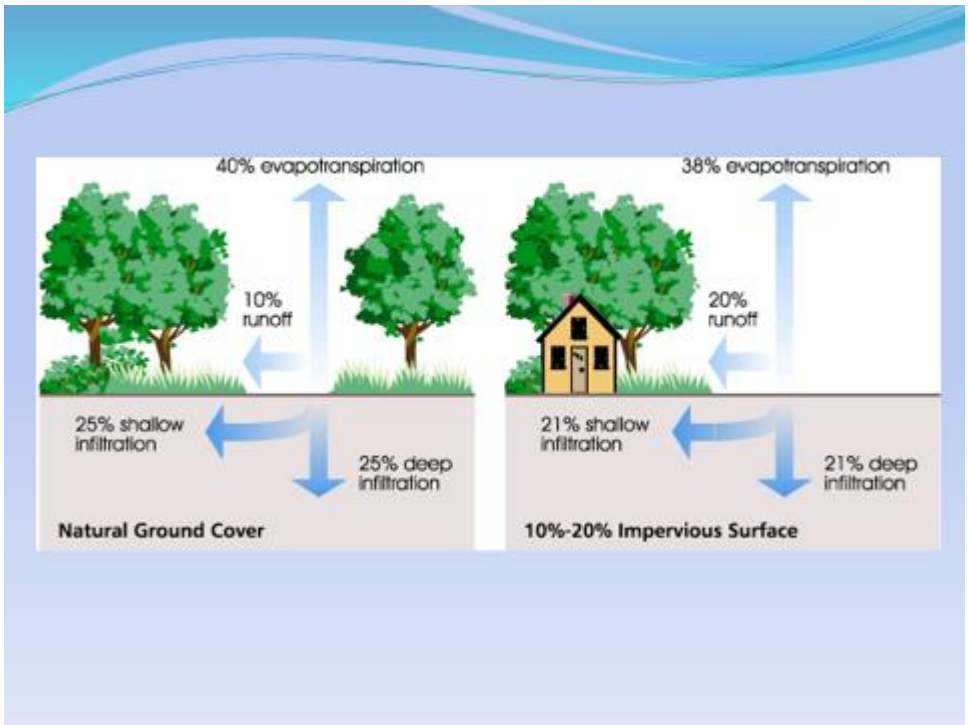
Stormwater (aka "stormwater runoff") refers to the water running off of developed areas during and immediately after rain. In undisturbed/forested watersheds, about 5% of the annual precipitation becomes surface runoff, with the remainder evaporating, being used by vegetation, and infiltrating into the ground. In developed watersheds, the amount of water running off can approach or exceed 50% of the annual precipitation, depending on the degree of development and implementation of both structural and nonstructural approaches to deal with the stormwater runoff. Adding impervious surface increases the amount and velocity of stormwater runoff. Stormwater concerns focus on the negative consequences of excessive runoff and its effects on people (health and safety), property/infrastructure, erosion, impacts to aquatic biota (local and downstream), stream channel stability, groundwater recharge, and the quality and cost of treatment of drinking water. In addition, as stormwater flows across impervious surfaces, it picks up various pollutants. These include excess nutrients, oil and grease, bacteria, sediment, and toxic compounds. Polluted stormwater flows down storm drains and ditches, into local streams, and eventually into Jordan Lake.

"Stormwater management" is an umbrella term for the host of activities pursued to minimize the negative consequences of runoff. For the past several decades, about 5% impervious cover within a watershed has been recognized as a threshold for when stormwater management needs kick in to protect the aquatic health of receiving streams. Most of Carrboro has been developed to a level that exceeds this amount of impervious cover[19].

Though interdependent, stormwater management interests can be broken down into four related but separate environmental contexts, described in greater detail below: water quality management; erosion control from disturbed land; stream channel integrity; and drainage and flooding issues. A broad description of the Town's current and future stormwater activities and services that address these issues is also provided.

[19] An analysis completed as part of the 2012 Bolin Creek Watershed Restoration Plan revealed that the most upstream extent of the watershed was about 5 % impervious, with the highest % impervious (slightly > 20%) in Carrboro occurring in the Tanbark Branch watershed in downtown Carrboro.

Figure A2-1: Impacts of Development on Stormwater Runoff



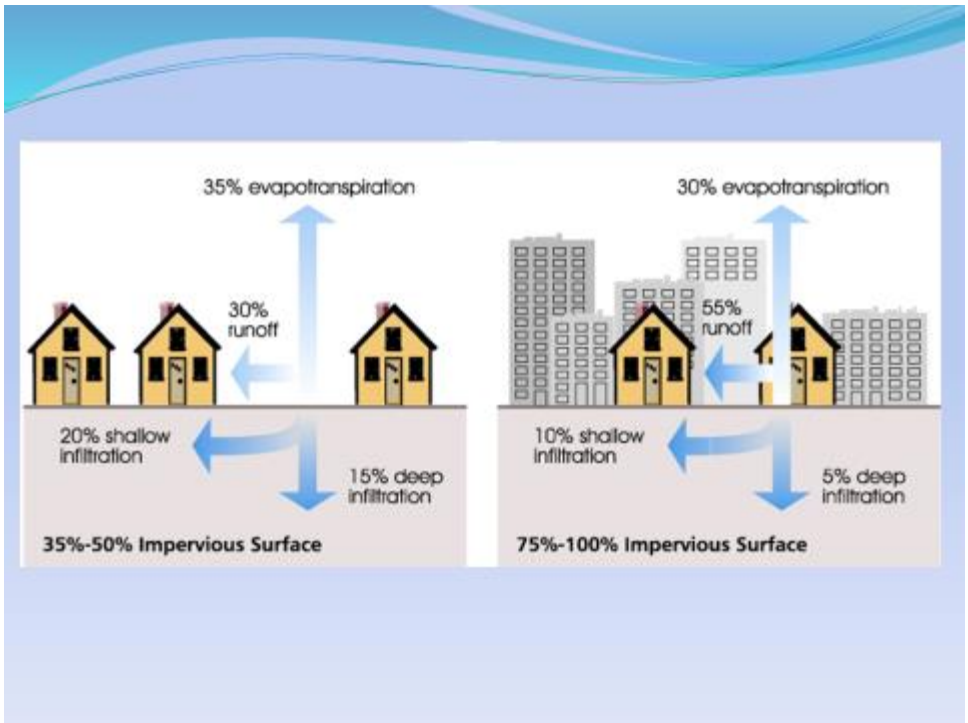


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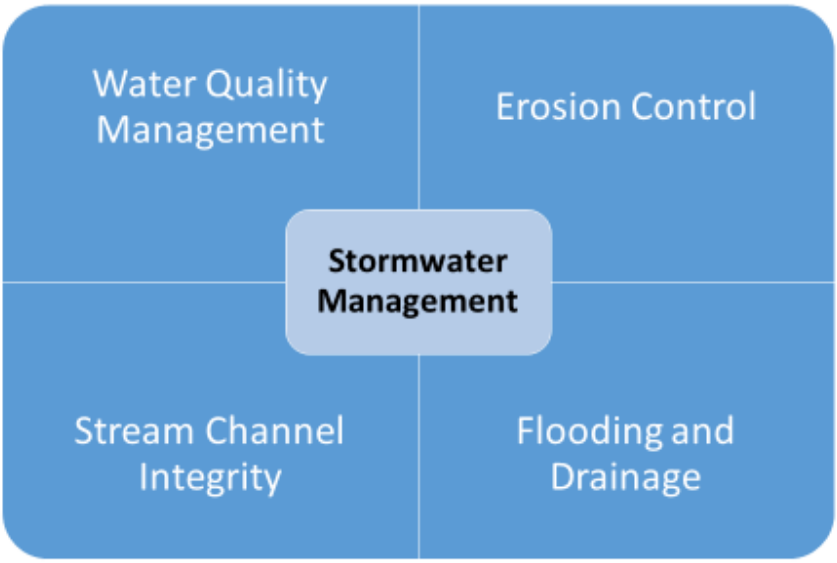
Figure A2-2:

The Separate but Related Environmental Aspects of Stormwater Management



Water quality management focuses primarily on minimizing impacts on aquatic and human health associated with toxic chemicals (e.g., heavy metals, pesticides, synthetic organic chemicals), nutrient enrichment (e.g., inorganic and organic fertilizer), oxygen demanding organic waste, microbial/ bacteriological contamination, siltation/sedimentation/turbidity, and related habitat degradation. Water quality has been regulated in Carrboro since 1999 by utilizing stormwater control measures that treat the first 1" of rain from a storm event that remove at least 85% of the "total suspended solids". 1" rain events happen on average several times a year. The emphasis on managing this amount of runoff takes into account the "first flush" concept in which a large majority of contaminants in runoff accumulate between rain events and then are carried in this first inch of rain. Carrboro has been relying on State design manuals and methods to identify the appropriate control measures to utilize for development projects permitted under the Land Use Ordinance (more below). However, some areas of Town were developed

when stormwater management and stream buffer ordinance provisions either did not exist or did not include more recent and extensive environmental protection provisions.

Erosion control for development projects falls under specific state regulations which, for Carrboro, is administered by Orange County staff. Erosion control for public infrastructure/facilities is regulated by the State. Bonafide agricultural, forestry, and mining are exempt from local regulation in Orange County, and are regulated under state and federal authority. Erosion control regulatory authority focuses on utilizing approved best management practices (e.g., site preparation; site stabilization with seed/straw/matting; silt ponds with inlet and outlet protection and skimmers; perimeter protection; non-erosive conveyance) for the construction site. Compliance for erosion control is limited to oversight of the correct design, installation, and maintenance of the BMPs in the site's erosion control plan; state law limits the ability to regulate the turbidity of water running off construction sites. The erosion control authority for construction/development projects does not extend to stream bank erosion of jurisdictional streams, nor to post construction erosion.

Stream Channel Integrity. During the past 10-20 years, watershed management has increasingly turned towards concepts recognized within the discipline of fluvial geomorphology, the study of the form and function of streams and the interaction between streams and the landscape around them. 'Fluvial' refers to the processes associated with running waters, 'geo' refers to earth and 'morphology' refers to channel shape. In this paradigm, an emphasis is placed on integrating stormwater management efforts that are site oriented with larger landscape and watershed scale efforts. Geomorphically motivated stream work can involve both less extensive ("stream repair") and more extensive ("stream restoration") projects which involve reforming the stream channel itself to create a more stable channel. In urban and urbanizing areas, channel geomorphology can be significantly compromised from more natural stream form and function; "natural channel design" techniques can be used to improve the channel form and function. Such projects can be relatively complex and expensive, given the sensitive ecology, engineering, regulatory and earth moving components. All intermittent (seasonally flowing) and perennial (continually flowing) streams are considered to be "jurisdictional", which means that their fundamental form and integrity are regulated under federal law, administered by both the Army Corps of Engineers and the State, under Sections 401 and 404 of the Clean Water Act.

While the largest floods move large amounts of sediment over short periods of time and shape the valleys and floodplain, they are relatively rare. The current scientific/engineering understanding recognizes the importance of "bankfull" flows as the condition when channels receive their maximum erosive stress and of the most importance in defining a stream's shape. The term bankfull refers to the water level stage that approaches the top of the streambank before spilling out of the channel into the floodplain. Bankfull flows tend to occur on the average two out of every three years, and are greater than the flow associated with the 1" water quality design storm but less than flows during flood events. This means that management to dampen the peak runoff and associated flooding from a storm through detention and subsequent release of water during the hours following the peaking of runoff can actually increase streambank erosion if the volume released approaches the "bankfull" flow. Carrboro passed LUO provisions in 2012 limiting the allowable increase in the annual volume of runoff specifically to recognize and address this potential, along with the need to maximize infiltration for groundwater recharge. For over a decade, Carrboro has also been participating in Bolin Creek watershed restoration activities which prioritize geomorphic restoration.

Flooding. Stormwater management to minimize flood impacts in Carrboro is driven by insuring no increase in the "peak" flow during a storm event for the 1 to 25 year recurring design storms (in a 24 hour period), or an amount of rainfall and runoff on the order of 5 times more than for the water quality design storm, and also an amount of water exceeding the bankfull/channel forming flow.

Managing flooding from a property damage perspective in regulated floodplains falls under state and federally administered floodplain management programs, with a prime concern being impacts on insurable properties. These regulations involve a continual updating of maps of flood zones regulated through flood modeling studies performed by the NC Floodplain Mapping Program, with oversight from FEMA. In Carrboro, these areas are located adjacent to the largest tributaries, i.e., Morgan Creek, Bolin Creek, Jones Creek, and Toms Creek.[20] It is worth noting that while federal and state floodplain regulation insures that new structures are not located in regulated flood zones and mapping is kept up to date, and provides relief for affected property in regulated flood areas, it does not cover low lying lands adjacent to smaller tributaries, nor overland runoff outside of recognized stream channels. The Town's participation in the National Flood Insurance Program, starting in 1976, has allowed property owners

[20] The most serious flooding impacts in Carrboro have been along Tom's Creek. More information is available for Toms Creek and two other locations with flood related impacts at this link

access to subsidized insurance rates and grant funding. At the time the Town's participation began, the city limits encompassed approximately two square miles and is estimated to have included about 3,500 residences. Nuisance flooding of properties in low-lying areas occurs in several areas, primarily those developed prior to the mid-1970s. The Town's Drainage Policy, adopted in 1984[21], contains the framework for deciding how drainage responsibilities are determined and paid for. The Town does not currently have a more fully developed Drainage Assistance Program for supporting private property landowners with drainage issues. Creating the Stormwater Utility provides an opportunity to revisit this policy and consider such a program.

Two additional aspects of stormwater management involve the regulation of stormwater runoff from new development, and managing the conveyance of runoff.

Regulating Stormwater in New Development. The Town Land Use Ordinance was put in place effective November 25, 1980, replacing the earlier, separate subdivision regulations and zoning ordinance. Article XVI of the Land Use Ordinance addresses flood damage prevention, stormwater management, watershed protection, and water quality buffer protection. Stormwater related provisions include sedimentation and erosion control during construction; impervious surface limitations and other standards for the University Lake watershed; regulation of peak flow, water quality from the 1" storm, and annual stormwater volume; and maintenance of structural stormwater control measures such as detention basins and bioretention (rain gardens). A series of updates to these requirements have been pursued over several decades to respond to Town interests and initiatives and also to federal and state requirements. The land use planning requirements for water supply watershed protection were amongst the first to be developed in North Carolina, and several of the other provisions exceed state and federal minimum requirements.

Stormwater Conveyance System and Facilities Maintenance. Under the NPDES permit (described below), the Town is responsible for defining and maintaining a "Municipal Separate Stormwater Sewer System" ("MS4") for the conveyance of runoff within Town limits. This system is by definition public, and therefore occurs in the public right of way or through dedication to the Town. Carrboro's current stormwater conveyance system utilizes a combination of conveyance approaches, ranging from curb and gutter, sidewalks and shoulders, underground piping, grassed swales, ditches including those with rip rap

[21] Available at http://www.townofcarrboro.org/DocumentCenter/Home/View/4969

or armor, and for some conveyances, detention and/or dissipation systems at outlets prior to entering receiving waters. The Town has mapped a total of 88 miles of stormwater conveyances (of all types including open channels and pipes), 52 miles of which are on Town property, 13 miles of which are on State property, and 23 miles of which are on private property. The Town initiated this stormwater mapping effort in 2000. The program has involved inventorying all storm drainage facilities within the Town's corporate limits and ETJ. All public drainage structures and many private structures have been mapped, including surveying of public structures. The mapping program has included determination of:

- Horizontal and vertical location of storm drainage structures and open end culverts
- Sizes and types of the piping connecting the drainage structures
- Type and condition of storm drainage structures.
- Visual inspection of each structure to detect illicit discharges or other irregularities.

The Town is maintaining and improving this data on an ongoing basis, and also routinely updates stream data to improve the accuracy and classification of perennial, intermittent, and ephemeral streams. [22]

Efforts for keeping pollutants out of the system and maintaining and inspecting the system include:

- Integrated Pest Management Program (IPM) - The Town has adopted an IPM policy and program as a comprehensive approach that gives priority to prevention and management of pests including insects, weeds, and plant disease by the least toxic method.

- Storm Water Conveyance Systems: Reviewing protocol and schedule for cleaning swales, catch basins, and pipe systems and proper disposal of waste from clean-up operations

- Streets and Infrastructure: Maintenance activities and inspection procedures for street sweeping, leaf collections, and solid waste collections. The Town has a vacuum sweeper truck for removal of sediments and pollutants from street surfaces in the downtown district and on some arterial and residential roads. The Town's sweeper is equipped with a "wander hose" attachment that allows removal of debris and sediments from curb inlets and catch basins.

- Vehicle Wash Area - Public Works has a wastewater separator tank that is connected to the sanitary sewer system. Periodically, the contents of tank are removed by a licensed and regulated disposal company.

- Road Salt/Sand: Evaluating storage conditions and application protocol and rates;

[22] Mapped streams include 136 miles of streams (70 miles of ephemeral (Town buffered) streams and 66 miles of jurisdictional streams)

There are currently less than 10 Stormwater Control Measures on Town property but more are planned for as part of current projects and in the Capital Improvements program.

Who regulates the Town and how?

There are two primary sets of stormwater regulations with which the Town must comply. The first is the National Pollutant Discharge Elimination System (NPDES) regulations and the second is the Jordan Lake Water Supply Nutrient Strategy (Jordan Lake Rules) regulations. The NPDES regulations are a requirement through the federal Clean Water Act (administered by the State), while the Jordan Lake Rules have been developed by the State, under a federal "TMDL" (Total Maximum Daily Load") based on concerns around overenrichment with nitrogen and phosphorus. Additional information is available from the links provided in the Appendix.

NPDES Permit. The NPDES program was established in 1972 under the authority of the Federal Clean Water Act. In 1990 and starting with large (population >100k) municipalities (and industries), EPA began regulating stormwater runoff. In 2000, the scope was extended to smaller municipalities, and EPA delegated the authority to the State to issue these municipalities (including Carrboro) a stormwater permit. The initial Carrboro permit was issued effective July 1, 2005, and required the Town to develop and implement a comprehensive stormwater management program that includes six minimum measures:

(1) Public education and outreach on stormwater impacts
(2) Public involvement/participation
(3) Illicit discharge detection and elimination
4) Construction site stormwater runoff control (delegated to Orange County)
(5) Post-construction stormwater management for new development and redevelopment, and
(6) Pollution prevention/good housekeeping for municipal operations.

The permit was first renewed in 2011, and again in 2017. The Town updated a required Stormwater Management Plan in 2012 that describes how the Town intends to fulfill the requirements of the permit; plans are in place to update the plan again in 2018[23]. Preliminary thoughts on potential new activities to improve efforts under this permit and plan are appended at the end of this memo. The Public Works facility has a separate NPDES stormwater permit that applies only to that site. It has been renewed once

[23] The permit and plan are available at http://www.townofcarrboro.org/pzi/Env/Water/swhome.htm along with additional program details.

and is about to be renewed for the second time. The Town has hired a contractor since the initial permit issuance to provide support with permit compliance.

Table A2-1: Summary of Stormwater Regulations Applicable to the Town

Regulation/Initiative	Description	Town Response
NPDES Permit	Includes public participation and outreach; illicit discharge; good housekeeping and pollution prevention for Town owned property/infrastructure; and post construction stormwater control. Post construction program is implemented through LUO, which includes stormwater management requirements for water quality and peak flow for many years. Most recent update was limiting increase in annual runoff volume in 2012.	Town has been pursuing activities under the permit since 2005. Town has delegated erosion control implementation to Orange County.
Jordan Lake Rules	Rules adopted in 2009 established requirements for existing and new development, buffers, and nutrient management. The existing and new development provisions have been legislatively delayed.	Town has implemented buffer provisions (for new development) that provide some geomorphic protection. Buffers serve as proxies for flood prone areas for smaller tributary streams. Nutrient management requirements were established in Town Code.
Bolin Creek Watershed Restoration	Since 2006, with Chapel Hill, the State, and EPA as partners, Town has worked to improve stream geomorphology and water quality. Relevant activities are also covered in regulatory programs-main added emphasis is on retrofits and restoration.	Town has pursued grant projects that have included several stream repair and stormwater retrofit projects.
National Flood Insurance Program	Insures that new structures are not located in regulated flood zones; provides relief for affected property	Town joined program in 1976 and established floodplain regulations soon after. Ongoing work with Army Corps of Engineers and NC Floodplain Mapping Program to extend reach by mapping floodplains and establishing regulatory flood zones further upstream than minimum required.
Section 401/404 of Federal Clean Water Act	Protects jurisdictional streams and wetlands from damage via grading, piping, etc.	This is implemented by Army Corps and NCDWR. Town coordinates to obtain copies of permits and determine applicable requirements.

Jordan Lake Rules. Jordan Lake was impounded in 1981. The lake was created to provide flood control, drinking water supply, protection of downstream water quality, fish and wildlife conservation, and recreation. As a waterbody that has been identified as "impaired", there has been a several decade's long process by the State and stakeholders, with oversight by the USEPA, to study the lake and develop a

strategy to restore water quality in Jordan Lake. A set of regulations were adopted in 2009 (the "Jordan Lake Rules") with a variety of subsections applying to different regulated parties. As a regulated entity in the upper New Hope watershed, Carrboro falls under the upper New Hope percent reduction goals for nitrogen (8%) and phosphorus (5%) for existing development in Carrboro. Rule provisions related to nutrient (fertilizer) management and buffers have been fully implemented[24], however, provisions relating to stormwater management from both new and existing development have been placed on hold until 2019 pending further study, most recently by S.L. 2016-94. Staff have estimated that it will cost the Town a minimum of over $4M to meet the required reductions under Stage 1 of the existing development part of the Rules as developed in 2009, and have been identifying potential retrofit projects for the past five years as part of State reporting requirements, with more information appended below and in the Town's Capital Improvements Program. Stage 2 of the Jordan Lake Rules could require the Town to reduce nutrients even further. It is preliminary at this point to attempt to estimate the cost of the Stage 2 rules.

Bolin Creek Watershed Restoration Team. Carrboro staff worked with Chapel Hill and other local, state and federal agency staff in 2006 to create the Bolin Creek Watershed Restoration Team (BCWRT) to proactively respond to the listing of Bolin Creek on the list of state and federal impaired waterbodies. At the time, the Bolin Creek watershed was selected as one of only 7 watersheds in the state to receive focused state and federal assistance in preparing grant applications and leveraging other resources to remove Bolin Creek from the impaired waters list. The selection was based on Bolin Creek's impairment listing and the existence of restoration planning efforts for the larger Morgan and Little Creek Watersheds, along with the local capacity for progressive environmental initiatives. The BCWRT's long term goal is to improve the health of Bolin Creek and its tributaries and remove it from the impaired waters list. This is an ambitious goal that will require a robust commitment.

To date, the following successes have been achieved:

- In 2003, a watershed assessment of the Little Creek watersheds in which Bolin Creek is located was completed
- In 2004, a management study of the Morgan and Little Creek watersheds was completed.
- In 2006, the NC Division of Water Quality and EPA pledged staff assistance.
- In 2007, the Team received a Clean Water Management Trust Fund grant that was used to conduct a detailed geomorphic analysis to identify areas of erosion, instability, and other high risk locations.

[24] The Town's buffer provisions exceed minimum state requirements most notably by requiring wider buffers for jurisdictional streams and also including buffers for smaller ephemeral streams.

- In 2008 and 2009 the Team received two federal "319" grants to pursue restoration projects, planning, and monitoring, one led by Chapel Hill and the other led by Carrboro. Both grant efforts were successfully completed, including on the ground restoration projects in both towns and a planning/engineering study of a drainage area in downtown Chapel Hill. In 2012, a Watershed Restoration Plan and Watershed Situation Assessment for Bolin Creek were completed as part of the grant project efforts.

Monitoring

Ongoing Creek Monitoring. Benthic macroinvertebrate (aquatic insect) monitoring is a primary means used by the NC Division of Water Resources to assess creek health, but state resources are only able to support infrequent (every 5 years at best) and limited benthic monitoring. Recognizing this, the Town has been pursuing much more extensive benthic monitoring for the past 15 years as a primary means for assessing creek health. This sampling continues to reveal impacts that warrant close attention. Sampling on Bolin Creek has consistently indicated Good-Fair water quality in upper Bolin Creek, especially at the most upstream site (just upstream of Winmore); most recent sampling has shown this site to be marginally achieving this rate. Areas further downstream have fluctuated between a Good-Fair and a Fair rating. ("Fair" is the threshold which triggers listing on the State's impaired streams list.) Chapel Hill is also using benthic insects as a key indicator; abundant benthic and other data continue to indicate that Bolin Creek becomes more degraded as it flows downstream through Chapel Hill. This long term record of annual or better monitoring on Bolin Creek along with recent sampling of some smaller tributaries has created one of the best benthic macroinvertebrate monitoring small stream datasets in North Carolina. The declining aquatic health moving downstream along Bolin Creek indicates the ongoing stress to the creek. The more downstream extent of Bolin Creek in Carrboro to its confluence with Little Creek in Chapel Hill has been listed on the State/federal impaired streams (303d) list for many years.[25] Morgan Creek has been sampled upstream of University Lake, however, there is no suitable benthic habitat and therefore no sampling downstream of University Lake in Carrboro's jurisdiction due to the extensive stream channel incision.

Other Monitoring. With installation funds provided by the North Carolina Ecosystem Enhancement Program, streamflow measurement using a permanent United States Geological Survey (USGS) gage on

[25] Benthic monitoring reports can be found at http://www.townofcarrboro.org/pzi/Env/Water/bcmonitor.htm .

Bolin Creek near the municipal boundary (on Umstead Road) was initiated in 2012. Chapel Hill and Carrboro staff have worked out a cost sharing agreement for the ongoing operation and maintenance of the gage. This gage provides real time information of the cumulative runoff for roughly the northern half of Carrboro. There is also a USGS maintained stream gage on Morgan Creek just upstream of University Lake. From 1993 to 2008, Carrboro contracted with the Town of Chapel Hill Engineering Department to monitor stream water quality and gauge the effectiveness of stormwater management programs. Monthly testing included three sites in Carrboro. The waters were tested for water temperature, pH level, dissolved oxygen, specific conductivity, turbidity, nutrients, metals, and the presence of fecal coliform bacteria. In 2009, Chapel Hill discontinued this program and shortly thereafter began implementing a new effort focusing on more extensive benthic monitoring as a more holistic indicator of aquatic health.

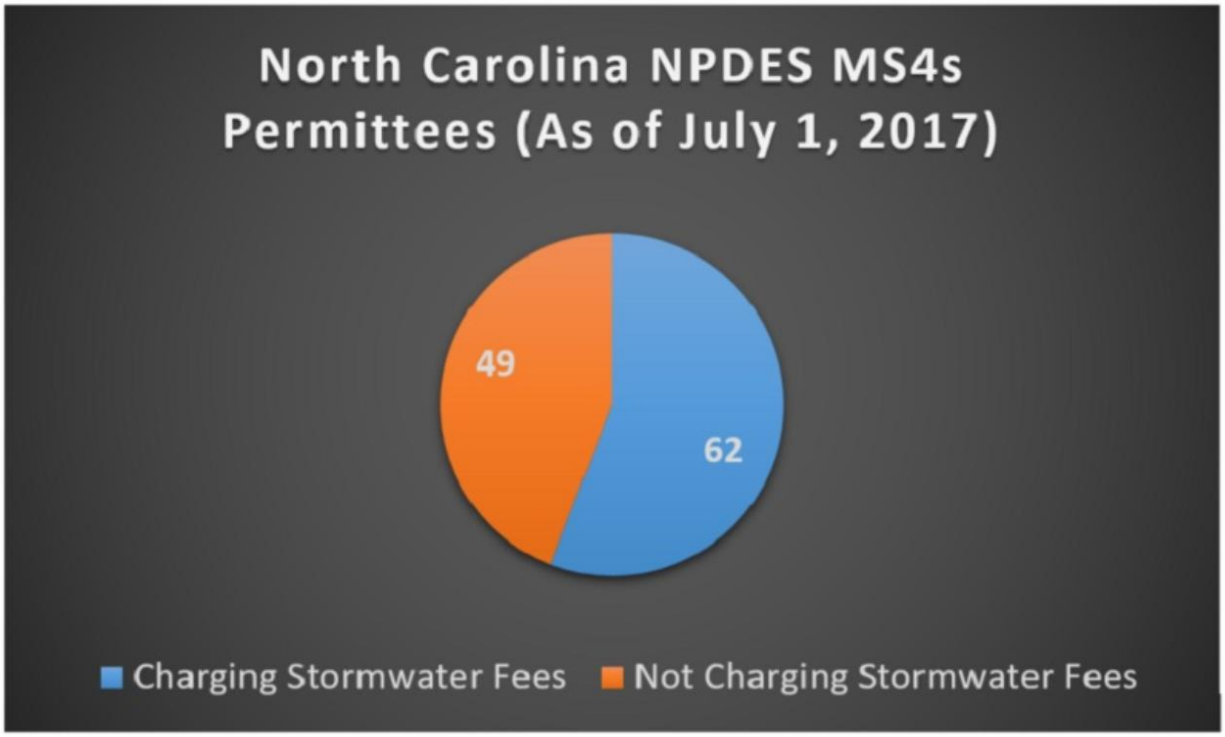
Integration of Different Program Elements

While there is certainly some overlap and opportunities for synergy in addressing the different elements of stormwater management discussed above, this overlap has limitations. For example, reducing the nitrogen and phosphorus in runoff would result in relatively minor improvements in addressing flood management concerns, but would have more synergy with NPDES permit and Bolin Creek Watershed Restoration activities. Similarly, management of stormwater conveyance infrastructure for very specific drainage areas and property issues could provide localized flood mitigation/drainage improvement benefits, but with little or no improvement, and conceivably some additional impacts, for downstream aquatic ecosystems. Examples of a few interventions that have fairly universal stormwater benefits include reestablishment of woody vegetation, improvements in soil quality to facilitate infiltration, removal or disconnection of impervious surfaces or replacement of impermeable pavement with permeable pavement because of the increased infiltration, interception, and evapotranspiration, and pollution prevention and illicit discharge detection and elimination.

Appendix 3: Stormwater Utility Fees in NC (From UNC-EFC)

The University Of North Carolina School Of Government through their Environmental Finance Center tracks stormwater utility rates across the state (Figure 1) and has created an online stormwater utility "dashboard"[26] that compiles rate information. More than half of the municipalities in North Carolina with a population of at least 10,000 have already adopted stormwater utilities and associated fees. The EFCs resources and stormwater rate dashboard was used to compile the information presented in this appendix.

Figure A3-1 (from UNC Environmental Finance Center)



The dashboard provides useful information to assist the Town in determining the type of fee and fee structure to be proposed by studying rates that have been set up for other North Carolina municipalities. Due in part to the high cost of updating and managing impervious surface data, many municipalities have

[26] http://www.efc.sog.unc.edu/reslib/item/nc-stormwater-utility-dashboard#

implemented a flat rate. Most municipalities that have adopted a flat rate structure use one rate for residential properties and a higher rate for non-residential properties for the reasons described above.

62 municipalities currently have stormwater utility fees in North Carolina. The range of fees is shown in Figures A3-2-A3-9 (residential) and A3-10-A3-11 (nonresidential). These figures progress through a presentation of the rates across many municipalities, including some figures with filters to select municipalities that are the most similar to Carrboro for demographic and other attributes. While all the municipalities included in the EFC dashboard have NPDES stormwater programs, not all are subject to nutrient management rules such as the Jordan Lake Rules, nor do they all have state listed impaired waters. Figure A3-12 specifically compares the annual fee and rate type for municipalities subject to the Jordan and Falls Lake Rules. The rates for Jordan and Falls Lake watershed communities are generally higher than the average for the entire state, and could climb higher in the coming years as implementation of rules proceeds. Collectively, the rates of peer communities has been used as one input to help inform the recommended rate structure.

Figure A3-2

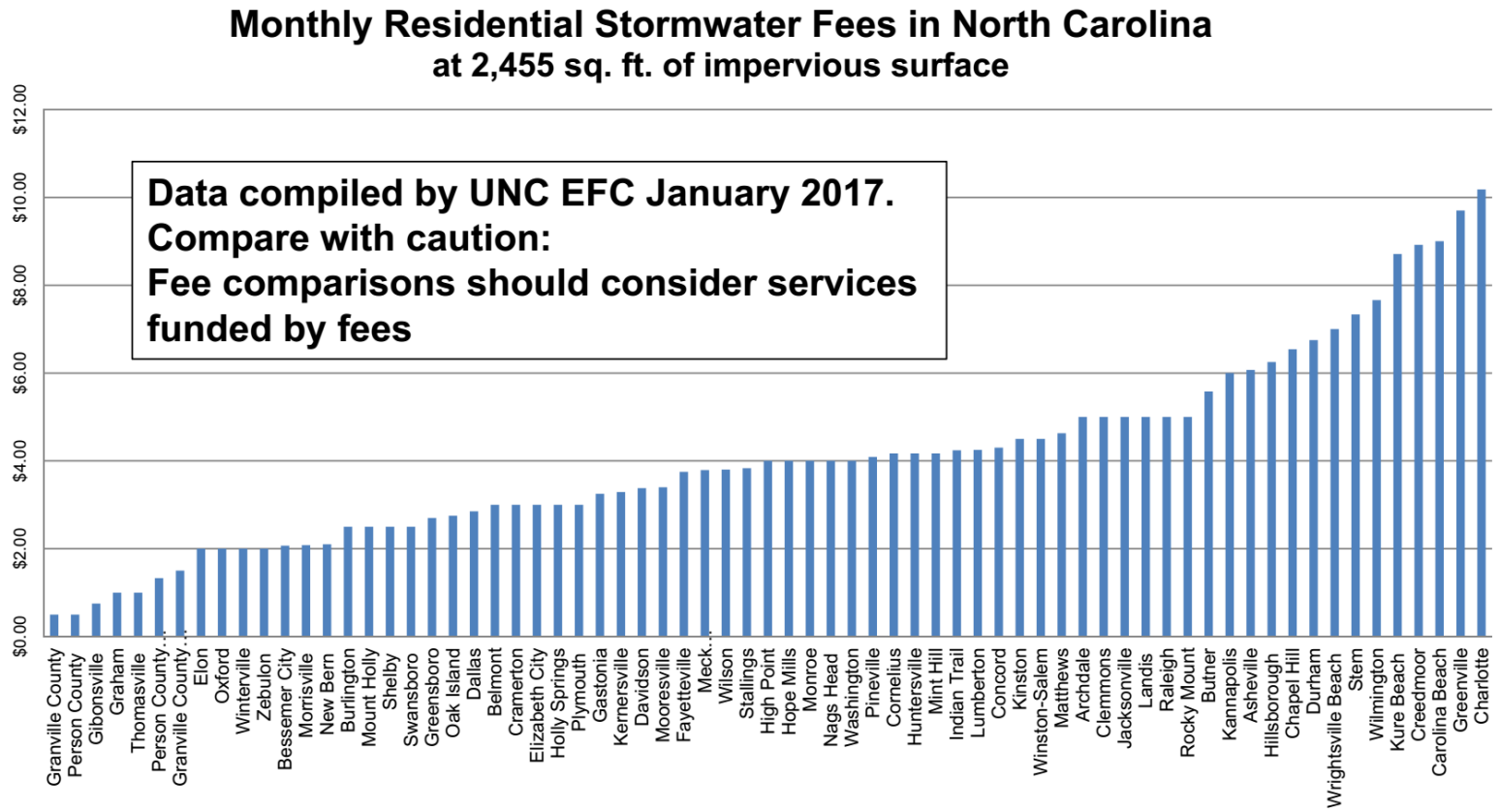
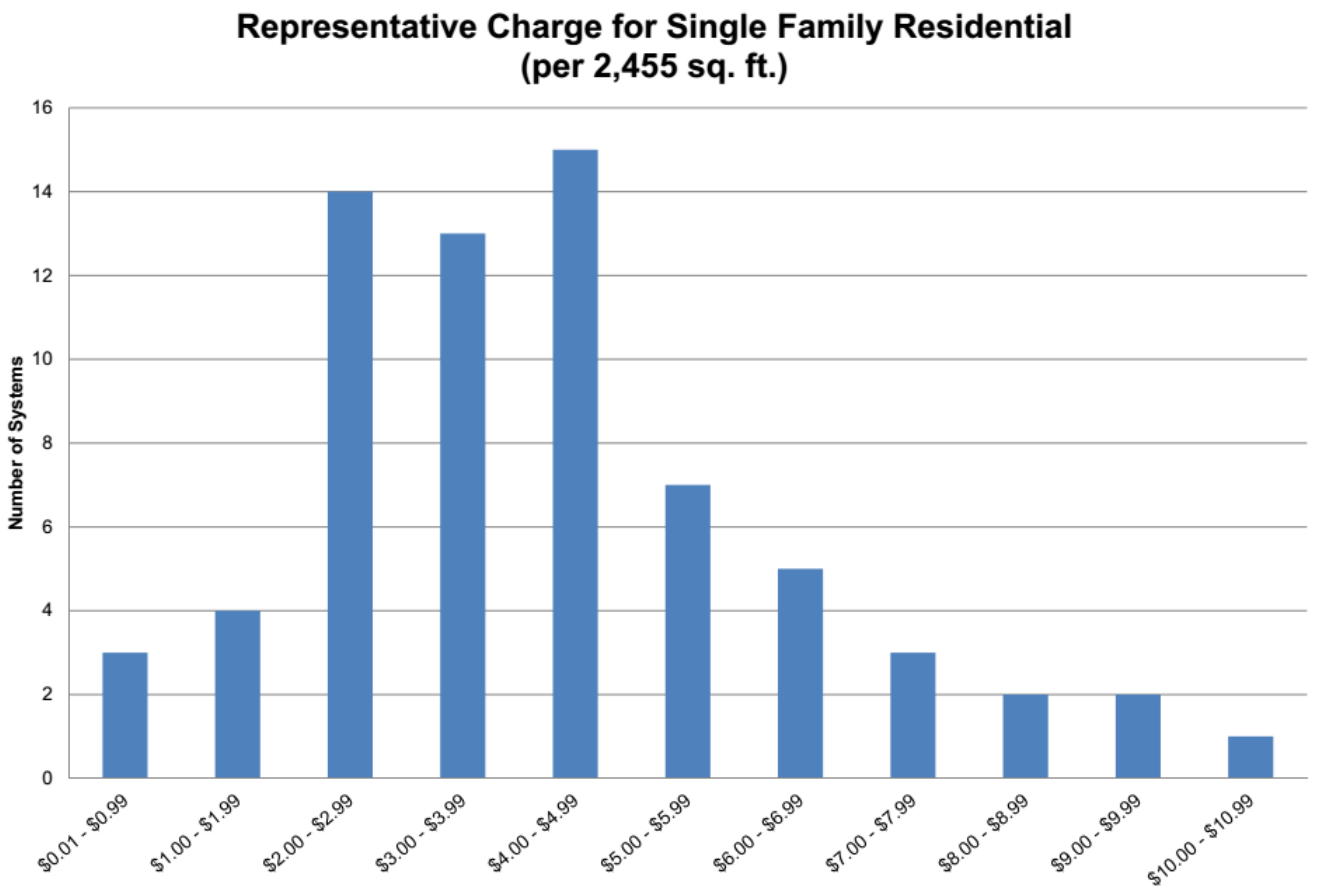

Monthly Residential Stormwater Fees in North Carolina
at 2,455 sq. ft. of impervious surface
Data compiled by UNC EFC January 2017.
Compare with caution:
Fee comparisons should consider services funded by fees
$0.00
$2.00
$4.00
$6.00
$8.00
$10.00
$12.00
Granville County
Person County
Gibonsville
Graham
Thomasville
Person County...
Granville County...
Elon
Oxford
Winterville
Zebulon
Bessemer City
Morrisville
New Bern
Burlington
Mount Holly
Shelby
Swansboro
Greensboro
Oak Island
Dallas
Belmont
Cramerton
Elizabeth City
Holly Springs
Plymouth
Gastonia
Kernersville
Davidson
Mooresville
Fayetteville
Meck...
Wilson
Stallings
High Point
Hope Mills
Monroe
Nags Head
Washington
Pineville
Cornelius
Huntersville
Mint Hill
Indian Trail
Lumberton
Concord
Kinston
Winston-Salem
Matthews
Archdale
Clemmons
Jacksonville
Landis
Raleigh
Rocky Mount
Butner
Kannapolis
Asheville
Hillsborough
Chapel Hill
Durham
Wrightsville Beach
Stem
Wilmington
Kure Beach
Creedmoor
Carolina Beach
Greenville
Charlotte

Figure A3-3


Representative Charge for Single Family Residential
(per 2,455 sq. ft.)
Number of Systems
16
14
12
10
8
6
4
2
0
$0.01 - $0.99
$1.00 - $1.99
$2.00 - $2.99
$3.00 - $3.99
$4.00 - $4.99
$5.00 - $5.99
$6.00 - $6.99
$7.00 - $7.99
$8.00 - $8.99
$9.00 - $9.99
$10.00 - $10.99
UNC
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11

Figure A3-4

What's "normal" for monthly stormwater fees?

- Median residential rate (at 2,455 sq ft) = $4.00
  - $1.63 per 1,000 sq ft of impervious surface

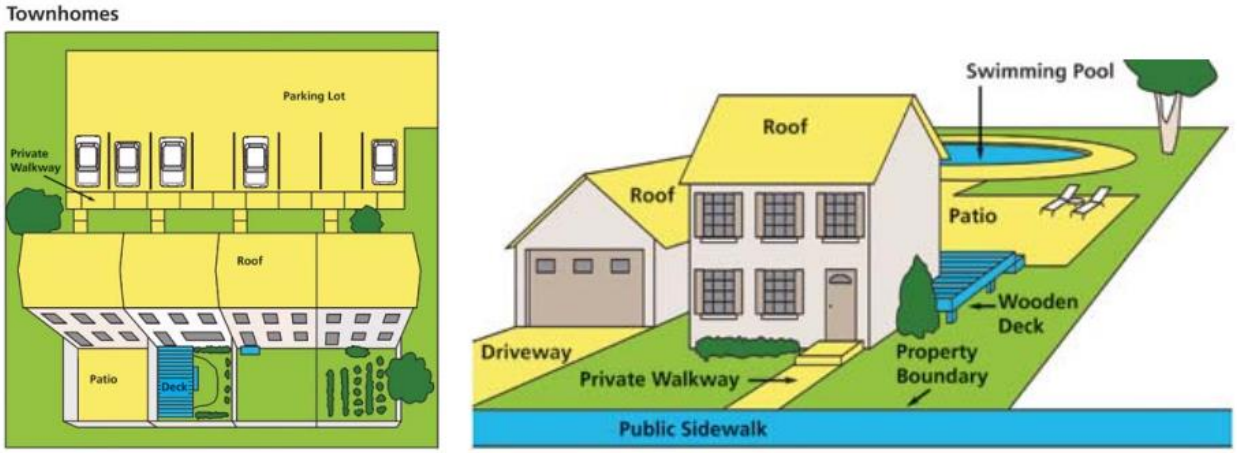

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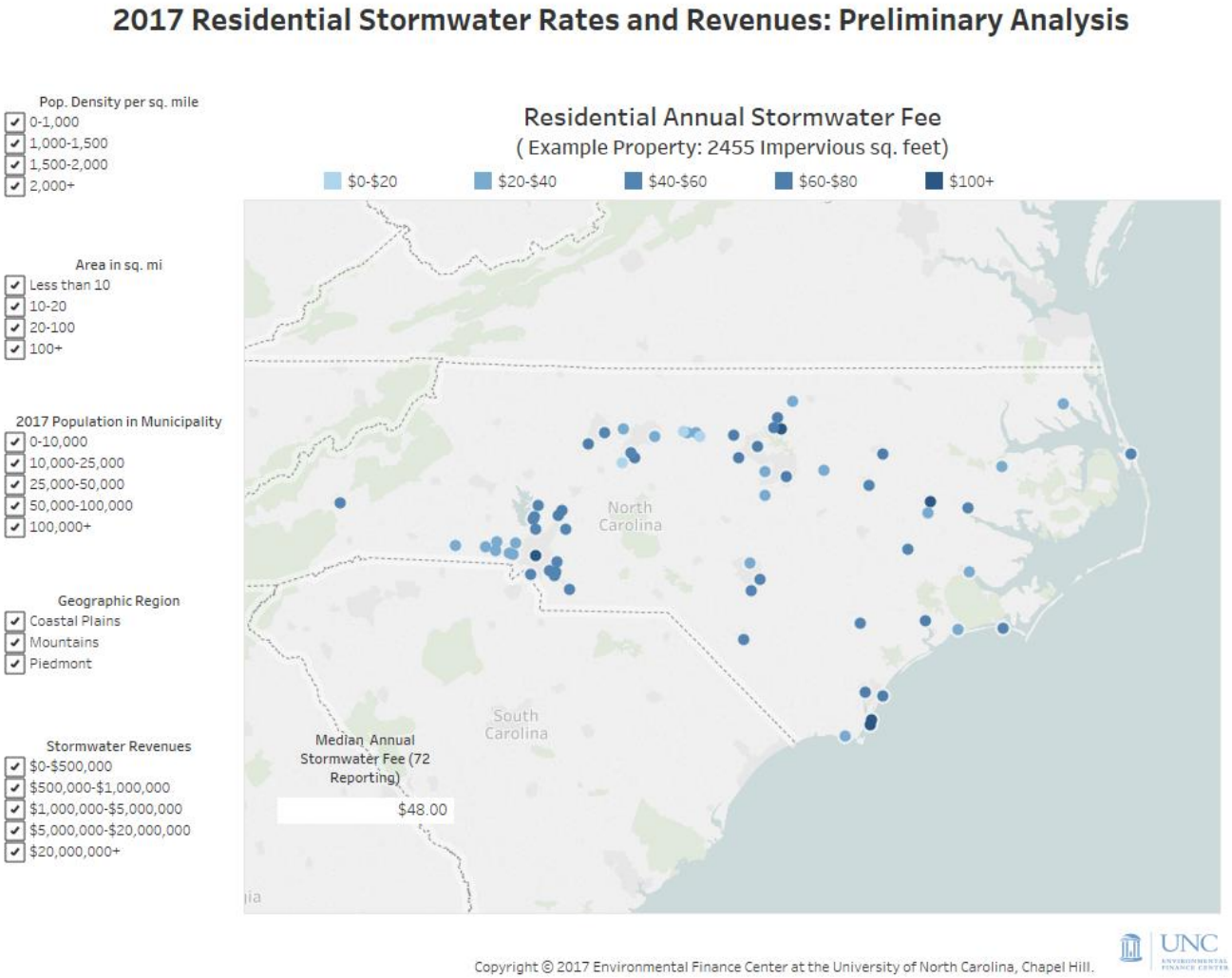
Figure A3-5


2017 Residential Stormwater Rates and Revenues: Preliminary Analysis
Pop. Density per sq. mile
0-1,000
1,000-1,500
1,500-2,000
2,000+
Area in sq. mi
Less than 10
10-20
20-100
100+
2017 Population in Municipality
0-10,000
10,000-25,000
25,000-50,000
50,000-100,000
100,000+
Geographic Region
Coastal Plains
Mountains
Piedmont
Stormwater Revenues
$0-$500,000
$500,000-$1,000,000
$1,000,000-$5,000,000
$5,000,000-$20,000,000
$20,000,000+
Residential Annual Stormwater Fee
(Example Property: 2455 Impervious sq. feet)
$0-$20
$20-$40
$40-$60
$60-$80
$100+
North Carolina
South Carolina
Median Annual Stormwater Fee (72 Reporting)
$48.00
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UNC

Figure A3-6

2017 Residential Stormwater Rates and Revenues: Preliminary Analysis

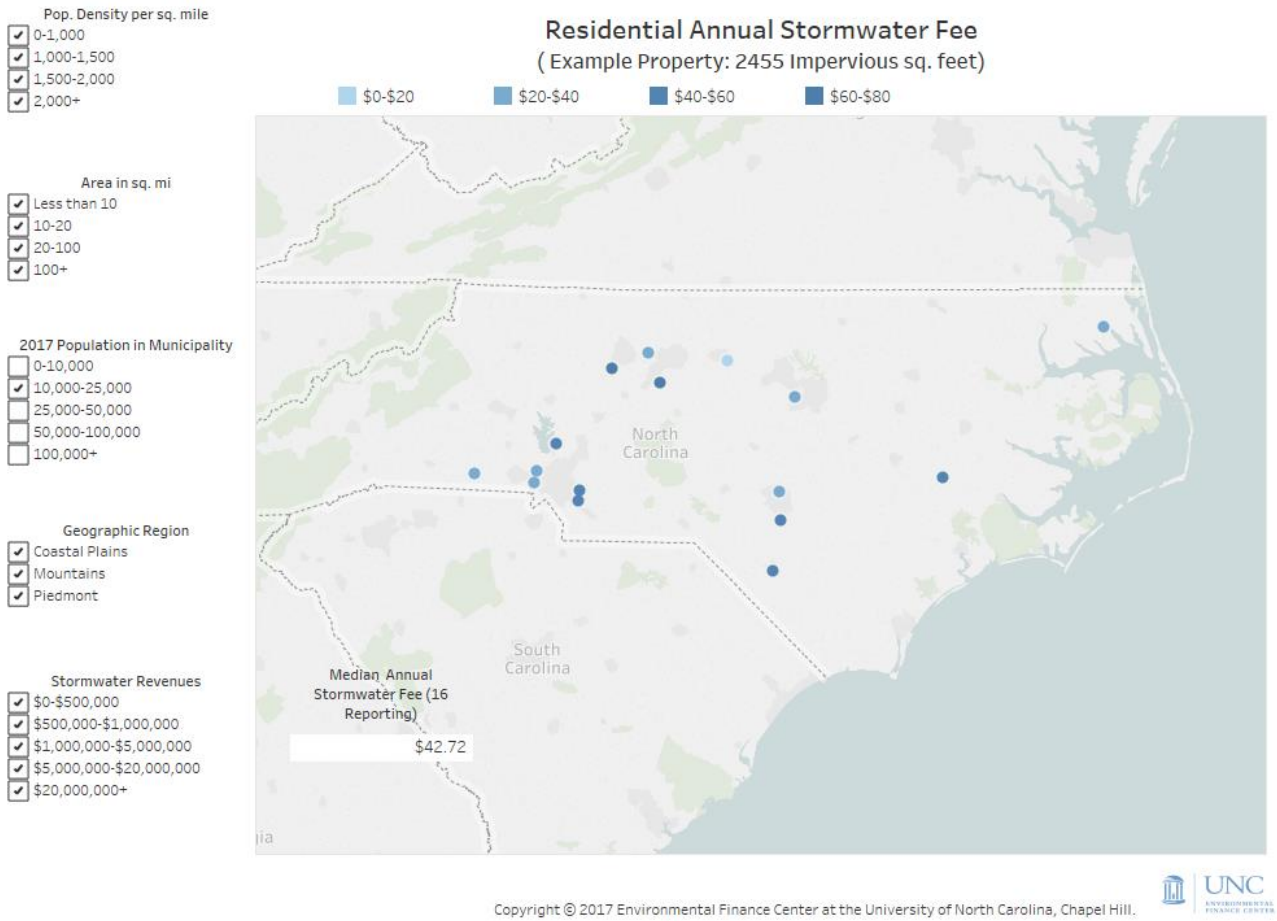

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Figure A3-7

2017 Residential Stormwater Rates and Revenues: Preliminary Analysis

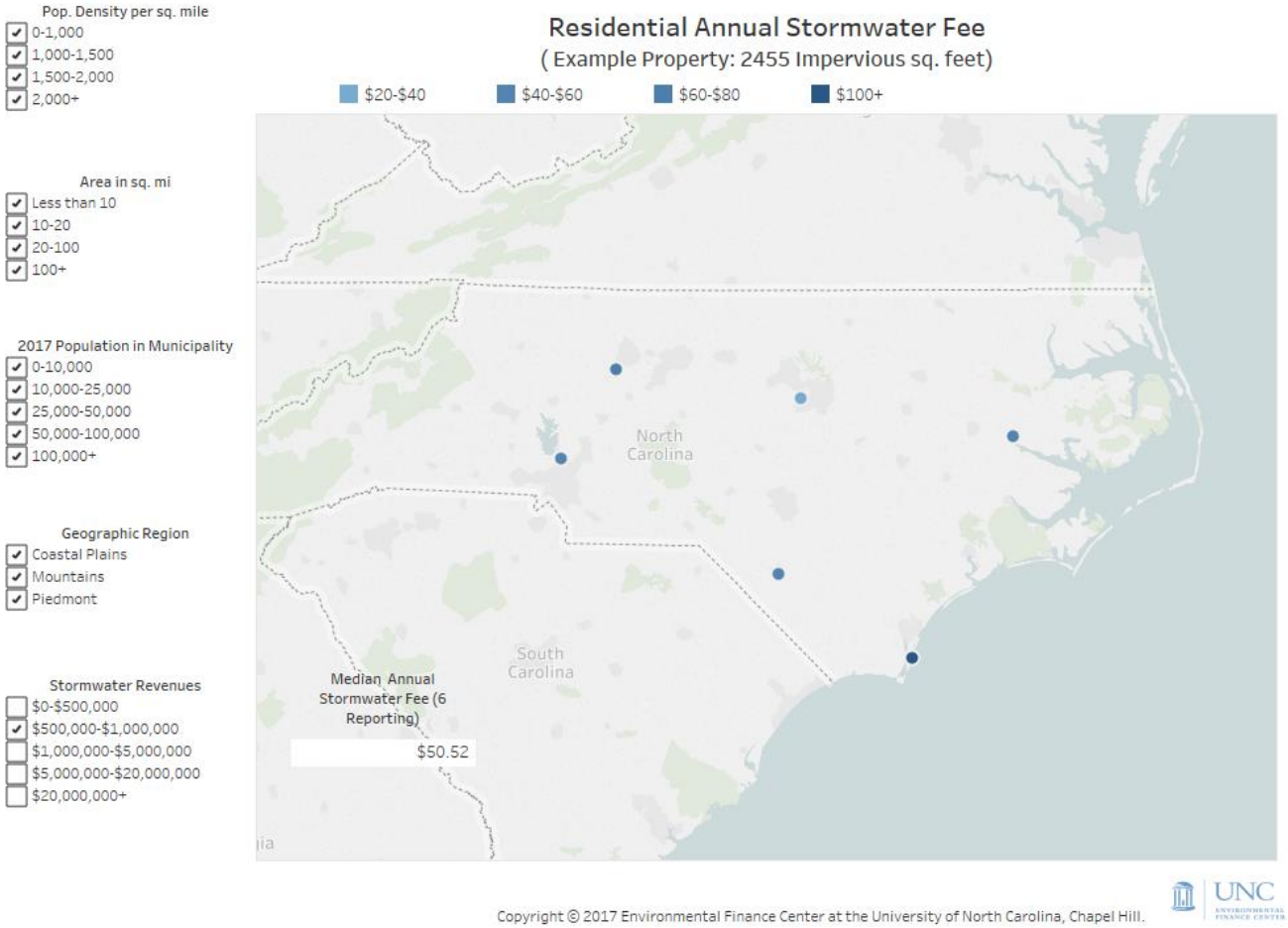

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Figure A3-8

2017 Residential Stormwater Rates and Revenues: Preliminary Analysis

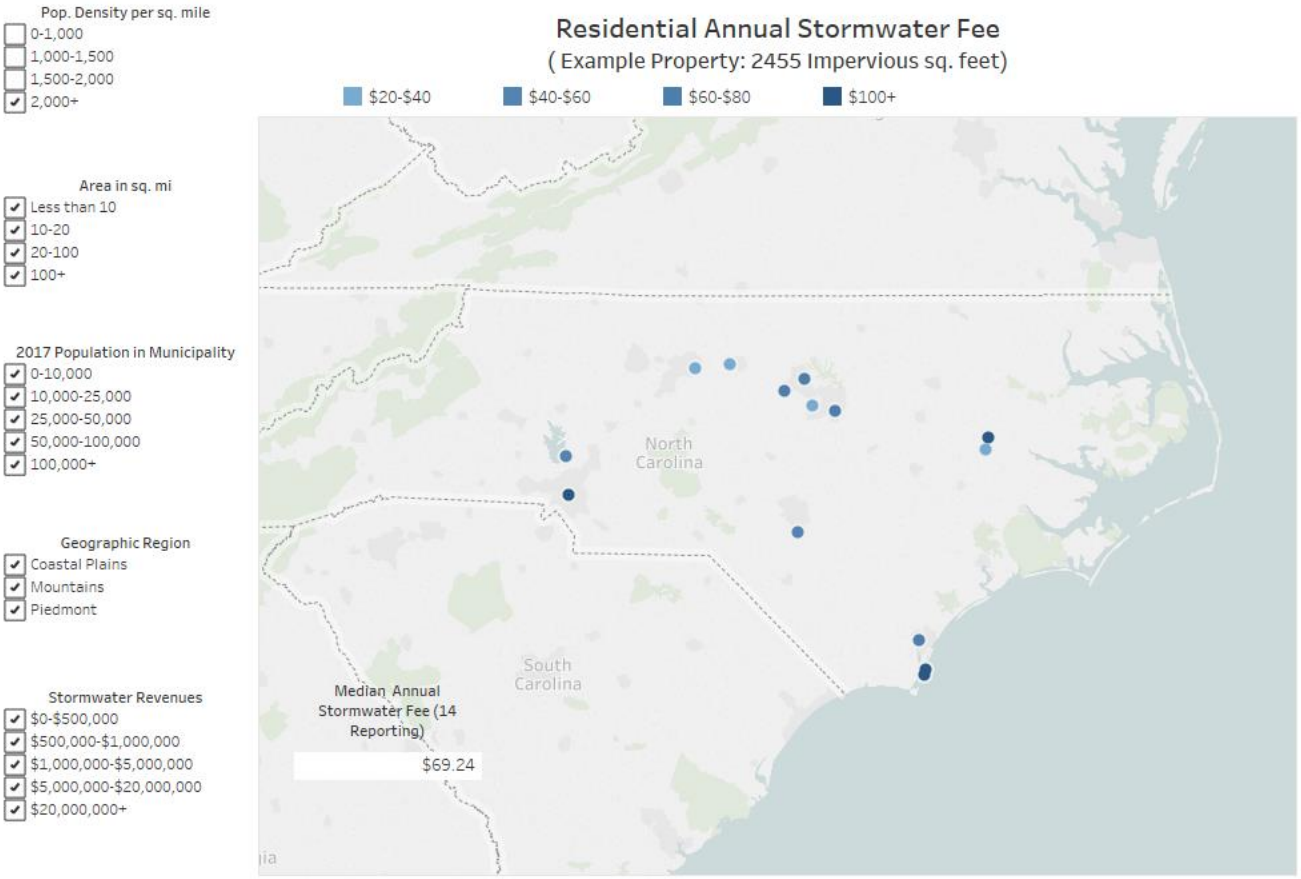

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Figure A3-9: Annual Residential Fees by Rate Type

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Figure A3-10

2017 Non-Residential Stormwater Rates and Revenues: Preliminary Analysis

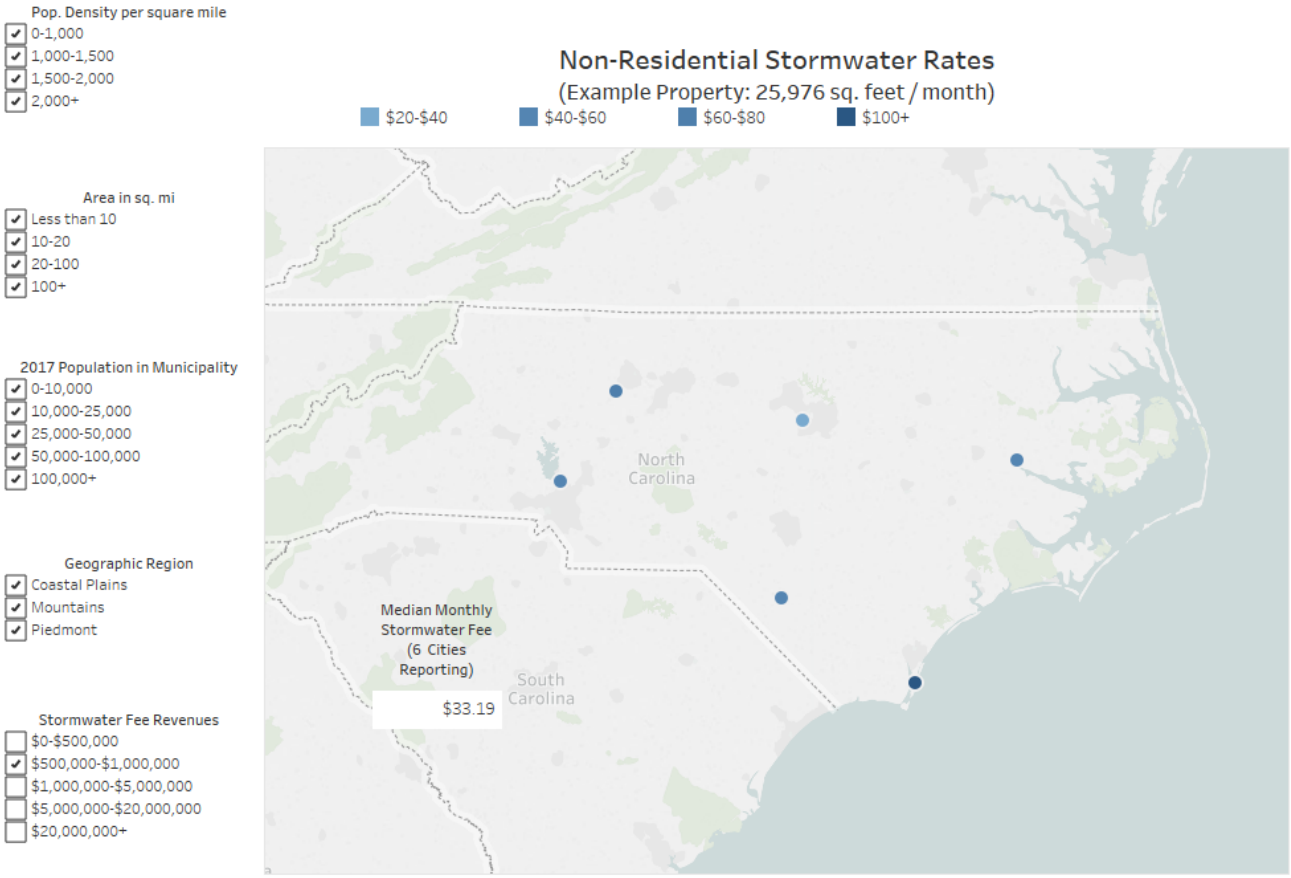

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Figure A3-11: Monthly Nonresidential Fees by Rate Type (per 26k sq. ft. impervious)

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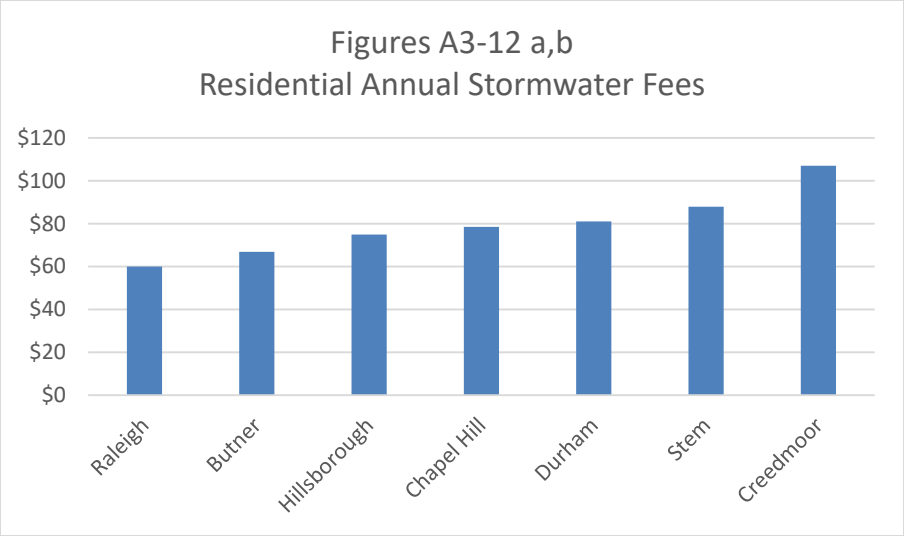
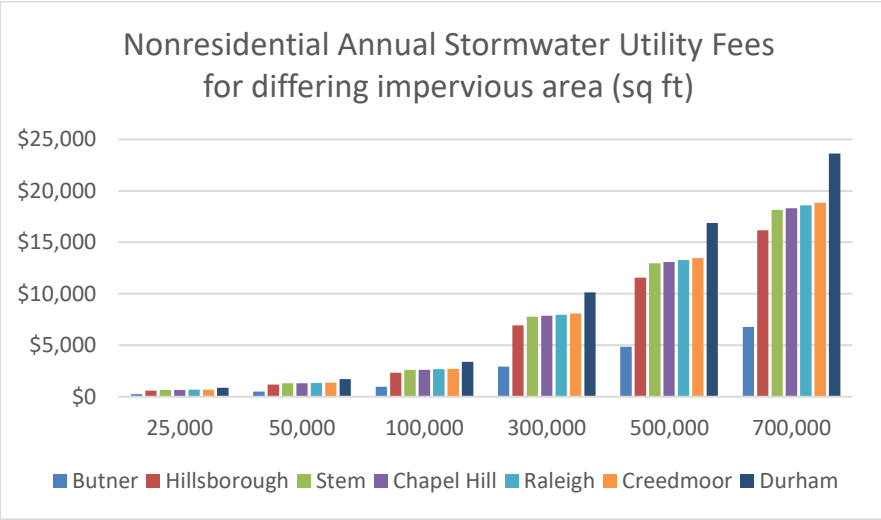
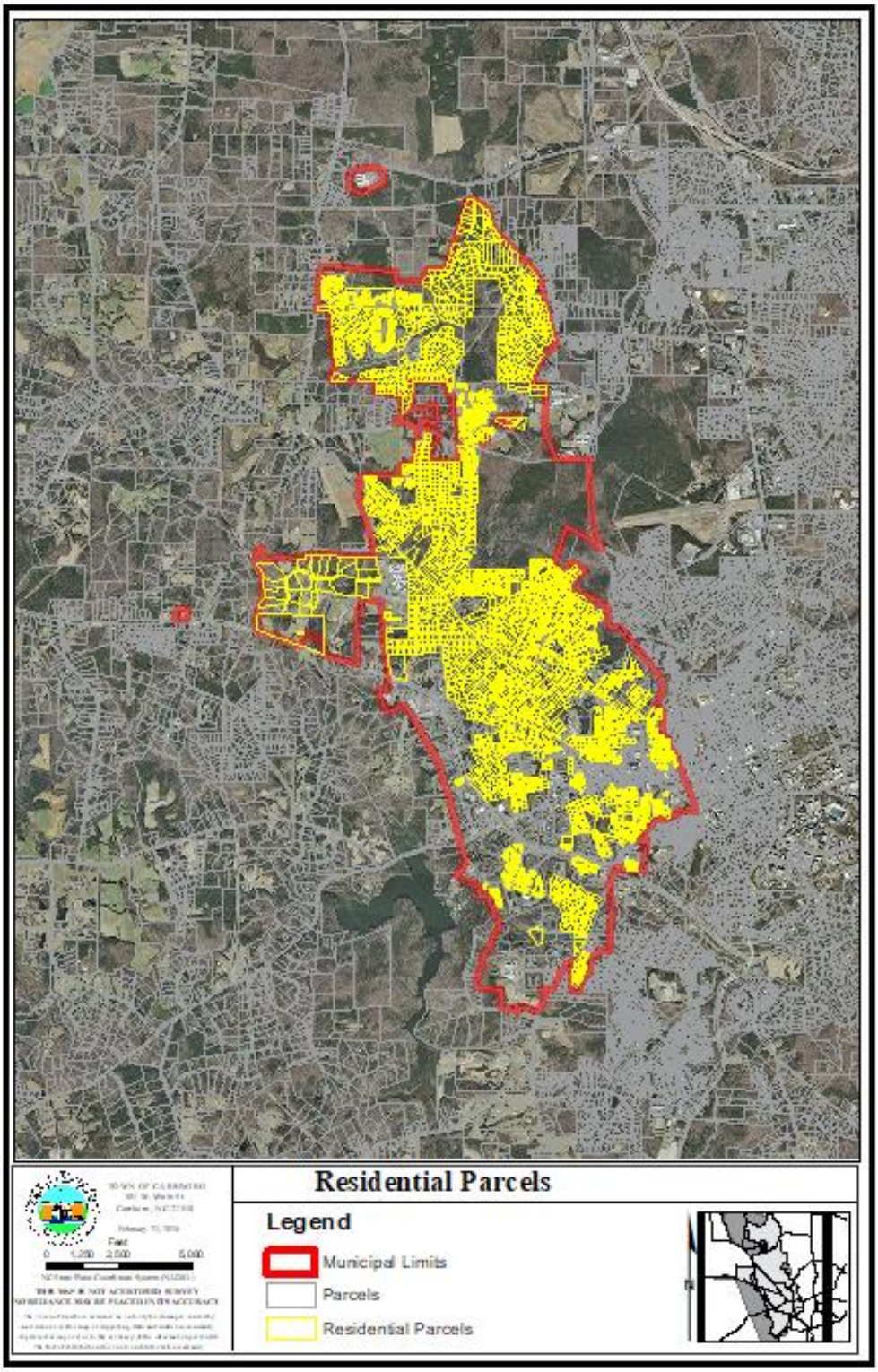
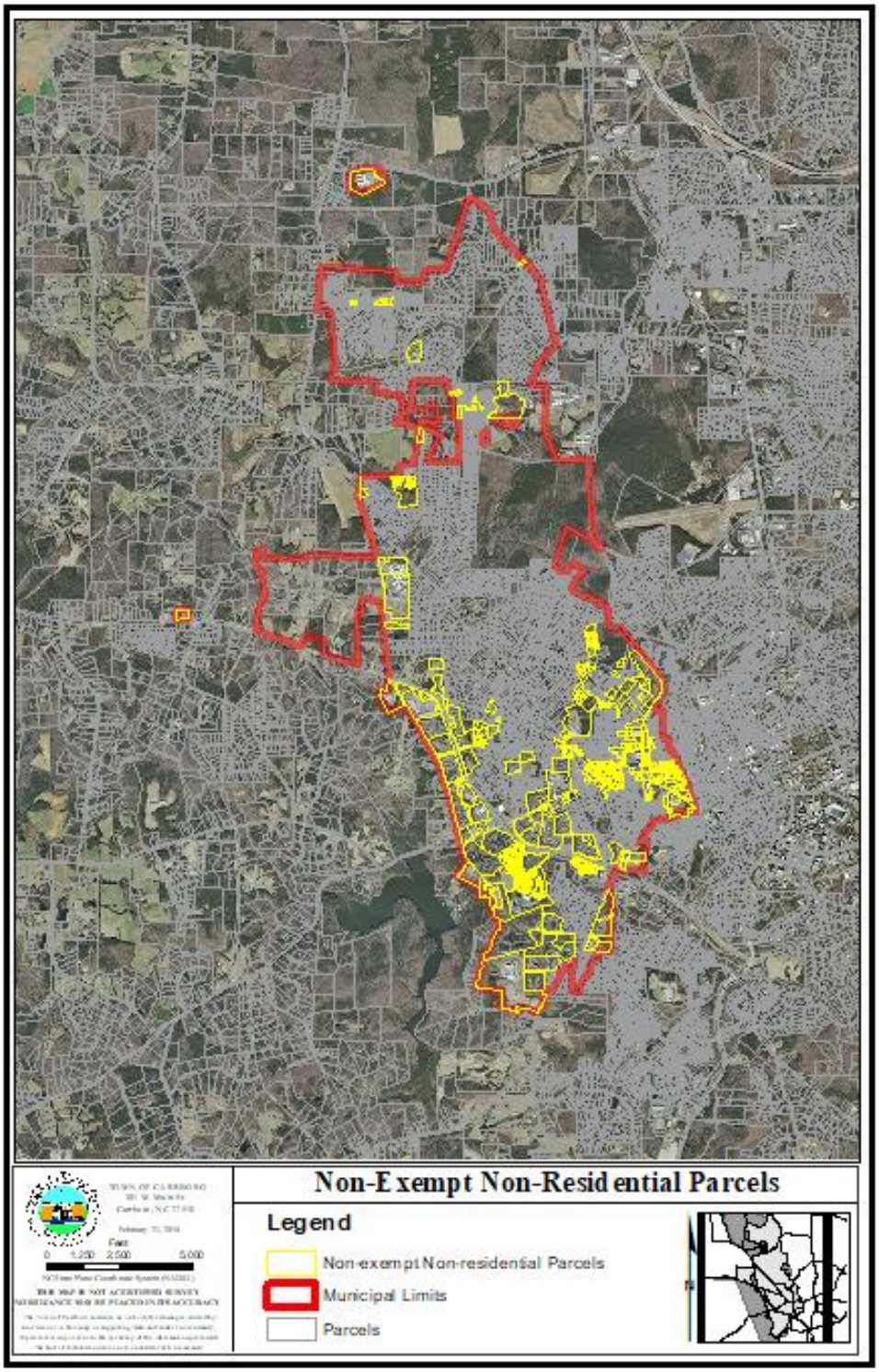

Figures A3-12 a,b
Residential Annual Stormwater Fees
$120
$100
$80
$60
$40
$20
$0
Raleigh
Butner
Hillsborough
Chapel Hill
Durham
Stem
Creedmoor


Nonresidential Annual Stormwater Utility Fees
for differing impervious area (sq ft)
$25,000
$20,000
$15,000
$10,000
$5,000
$0
25,000
50,000
100,000
300,000
500,000
700,000
Butner
Hillsborough
Stem
Chapel Hill
Raleigh
Creedmoor
Durham

Appendix 4: Maps of Non-Exempt Parcels




Non-Exempt Non-Residential Parcels
Legend
Non-exempt Non-residential Parcels
Municipal Limits
Parcels
Feet
0 1,250 2,500 5,000

Appendix 5: Summary of Identified Capital Projects/Retrofits

The following table provides a very short summary of potential capital stormwater retrofit projects that have been identified to date as part of annual reporting requirements under the Jordan Lake Rules. They will also provide regulatory benefits for the NPDES permit and Bolin Creek Watershed Restoration efforts, and nonregulatory benefits associated with creation of green infrastructure and community outreach and education. It is anticipated that capital project needs will continue to be further refined after the Stormwater Utility is established and staff are able to complete further analyses.

Table A6-1: Potential Retrofits for Addressing Jordan Lake Existing Development Rules

Type of Retrofit	Location	Notes
Bioretention and vegetated swale	Anderson Park	Concept studies completed by Sungate
Stormwater wetlands or bioretention	Town land adjacent to Morgan Creek	Preliminary site assessment completed.
Stormwater wetland; potential stream restoration	Carrboro Elementary School	Concept studies completed by CH2M Hill and NCSU
Stormwater wetland, bioretention, permeable pavement	McDougle School	Concept study completed by Sungate
Detention and bioretention retrofits	Carrboro High School	Concept study completed by Sungate
Bioretention, wetland, permeable pavement	OWASA WTP	Concept study completed by Sungate
Retrofit of detention basin	Carrboro Plaza	Concept studies completed by Tetra Tech, CH2M Hill, Sungate

One additional potential project is a stream restoration project at Carrboro Public Works where an actively eroding stream bank is approaching the adjacent structures and parking lot.

Appendix 6: FAQs

Stormwater Rate Structure

Why is a new stormwater fee needed?
Who will (and won't) have to pay the fee?
How can I find out how much it will cost for my specific property?
Will my HOA be assessed a fee?
What opportunities are there for input into the new fee and rate structure? How is the community being represented in the rate structure decision process?
What will the process be for disputing the fee assessed for a specific property?
How is the Stormwater Utility being funded?
How will the fees be billed?
Can the Town provide assurance that rates won't rapidly increase in the future?

Stormwater Administration and Operation

Has the decision to form a stormwater utility been finalized?
Is the program/utility an entity separate from the Town (like OWASA), or a department within the Town, or something else?
What kind of public oversight or public involvement does the utility have?
What kind of state and federal requirements does the Town have to meet with regard to stormwater issues?
Is there any cooperation with universities, state agencies, local governments, or other groups to address stormwater issues?
What specifically will the new stormwater utility do and how will the money that is collected be spent?
Why are gravel roads and gravel parking lots considered to be impervious?
Will the Town address drainage problems in my yard or neighborhood?
I live on top of a hill, and I don't ever have any drainage problems. Why should I have to pay for stormwater management services?

Stormwater Management Basics

What is stormwater?
Why do we need to manage stormwater?
What is a 'stormwater utility' and how is it different from a stormwater management program?
Why do we need a stormwater utility?
How does the stormwater management program benefit residents and businesses?
What is an impervious surface?

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Stormwater Rate Structure

Why is a new stormwater fee needed?
The Town's current stormwater program does not have sufficient capacity to address the stormwater program's needs. More and dedicated funding are needed.

Who will (and won't) have to pay the fee?
From the Town Code, in general, property owners with more than 500 square feet of impervious surface will have to pay the fee. More information is available at
http://www.townofcarrboro.org/DocumentCenter/View/4631 (Section 18-9 [a and b])

How can I find out how much it will cost for my specific property?
Tables 11 and 12 of this report provide the fundamental basis. With the draft rate structure, over 95% of non-exempt property owners will pay $75 per year. Properties with more than 6000 square feet but less than about an acre of impervious surface area will pay less than $1000 per year. Those properties with more than an acre of impervious area will pay more than $1000 per year. The Stormwater Utility Manager can be contacted for the estimated fee for specific properties.

Will my HOA be assessed a fee?
It depends. Most HOAs will not have to pay the fee. HOAs with more than 500 sf of impervious surface on HOA property that is not treated with an engineered stormwater control measure will be subject to the fee.

What opportunities are there for input into the new fee and rate structure? How is the community being represented in the rate structure decision process?
A community outreach process is planned in the spring of 2018; the process will include a range of approaches for getting the word out and seeking feedback on the new stormwater fee. This page will be updated with specific opportunities for learning more and providing input. A public hearing will be scheduled later in the spring. The Stormwater Advisory Commission is the appointed group assigned with advising the Town about all matters related to stormwater.

What will the process be for disputing the fee assessed for a specific property?
The process is discussed in the Town Code. As soon as the rate structure is adopted, a form for disputing the fee will be provided on the Town website.

How will the Stormwater Utility be funded?
The Stormwater Utility will be funded through the rate structure described in this report. The fees collected will be available only for stormwater management activities; the rate structure is being set up to create a self-sufficient program that does not rely on other funding.

How will the fees be billed?
Assuming an Interlocal Agreement between the Town and the County is executed, the fees will be included on the annual property tax bill that is sent out in the summer, with a deadline for payments of December 31.

Can the Town assure citizens that rates won't rapidly increase in the future?
The rate structure has been developed using a five year cost projection. There is no plan to increase the fees during this time frame. Future changes in the fee schedule will be subject to Stormwater Advisory Commission, Board of Aldermen, and public review. An important determinant for the potential/ eventual need for a fee adjustment is the State review of the Jordan Lake Rules which is planned for 2020.

Stormwater Administration and Operation

Has the decision to form a stormwater utility been finalized?
Yes. The Town adopted the new utility in the Town Code in June, 2017.

Is the program/utility an entity separate from the Town (like OWASA), or a department within the Town, or something else?
The Stormwater Utility is a Town managed administrative unit housed in the Public Works Department. It coordinates stormwater management activities for multiple Town departments using both Town resources and contract services.

What kind of public oversight or public involvement does the utility have?
The Town Code established a seven member Stormwater Advisory Commission (SWAC) that provides this function. The SWAC meets monthly.

What kind of state and federal requirements does the Town have to meet with regard to water resource issues?
The Town has two National Pollutant Discharge Elimination System - Phase 2 (NPDES Phase 2) stormwater permit, one that is town wide and one for the Public Works facility. These permits require the Town to meet the measures outlined in the permits to reduce and mitigate stormwater pollution. More Bolin Creek is on the State List of Impaired Waters. The Town participates in the Bolin Creek Watershed Restoration Team as a means for addressing the requirements associated with this listing. Carrboro is located in the upper New Hope watershed of Jordan Lake and is subject to the Jordan Lake Rules. The Town administers the state's Water Supply Watershed development regulations. The Town participates in the National Flood Insurance Program (NFIP) that requires administration of the federal regulations pertaining to floodplain management and other flood study related issues.

Is there any cooperation with universities, state agencies, local governments, or other groups to address stormwater issues?
The Town works in cooperation on a local and regional basis as well as with state and federal agencies. All units of government, institutions and agencies will continue to work together to meet the challenges and regulations facing all of us within the Jordan Lake watershed.

What specifically will the new stormwater utility do and how will the money that is collected be spent?

The utility will administer all aspects of the Town's stormwater program, involving the range of services described in the draft rate study. A summary five year cost projection is included. In a nutshell, the two largest expenses will be for program staffing (for both stormwater program staff and staff in other administrative units that spend stormwater related time in their job responsibilities), and for capital (>$100k) projects planned to begin in 2020. Some services will be delivered through contracting. The details will be determined as the utility is implemented, with ongoing oversight from the Stormwater Advisory Commission and Board of Aldermen.

Why are gravel roads and gravel parking lots considered to be impervious?
Typical gravel materials (including "Chapel Hill gravel") used for roads, parking lots, sidewalks, and paths are laid down to withstand heavy loads. Vehicles driving over these graveled areas compact both the underlying clay soil and the gravel, forming a seal through which water will not readily infiltrate the soil. Some landscaping or stormwater management applications involve un-compacted, washed stone that may not be considered impervious. This is a uniform grade aggregate that has been pre-washed and is of sufficient depth to promote infiltration into the soil.

Will the Town address drainage problems in my yard or neighborhood?
A future element of the stormwater management program being considered is to help property owners with drainage maintenance projects. A Drainage Assistance Program could be developed to assess, rank and prioritize drainage problems. Note that drainage problems between private property owners is outside the Town's purview and must be worked out between neighbors. However, stormwater staff may be able to offer technical advice for resolution of the problems.

I live on top of a hill, and I don't ever have any drainage problems. Why do I have to pay for stormwater management services?
Impervious surface on your parcel places a certain demand on the stormwater system. Stormwater runoff generated on your property must be controlled and conveyed once it leaves your property so that it does not create problems for others. Stormwater management activities with broad benefits include keeping the public streets drained and cleared, making necessary stormwater infrastructure upgrades, reducing erosion and other pollutants that enter streams and lakes, protecting and restoring streams and other aquatic habitat areas and collecting and conveying stormwater safely through all parts of the Town. A portion of the fees will also provide for compliance with federal, state, and local regulations for water quality improvements; administration of the Land Use Ordinance (LUO) through development review, inspections, bonding, and stream classifications; public involvement and educational programs; and responding to public health and safety issues that benefit all property owners. The Town's National Flood Insurance Program (NFIP) activities and are also relevant.

Stormwater Management Basics

What is stormwater?
Stormwater is runoff that is a direct result of precipitation. It flows in concentrated forms (pipes, gutters, channels, etc.) and diffuse forms (sheet flow) over all land forms. Precipitation can infiltrate into the soil and become ground water, be used by vegetation, evaporate, or flow into lakes or streams as surface runoff. The term "stormwater" refers to the increased quantity and reduced quality of the runoff and reduced infiltration and evapotranspiration in developed areas.

Why do we need to manage stormwater?
Urbanization causes significant changes in stormwater runoff characteristics, including increased volume and rate of runoff entering streams and the storm sewer infrastructure and reduced amounts of water filtering into the soil. Such changes cause increased erosion and formation of gullies in upland areas, increased in-stream scour and erosion, increased sediment deposition in lower areas, degradation of water quality, peak storm flows that are higher and faster, more frequent flooding, and negative effects on stream ecological communities. These impacts on both man-made structures and natural systems require continuous management, maintenance, repair and replacement of the Town's stormwater management system, and careful planning to mitigate existing and future problems.

What is a 'stormwater utility' and how is it different from a stormwater management program?
A stormwater utility is a legally authorized "public enterprise fund", adopted by ordinance and similar to a water or sewer utility. It is established to finance stormwater management program activities exclusively. The stormwater management program includes all stormwater related activities and services for the Town. The two terms are closely related.

Why do we need a "stormwater utility"?
With a utility, the Town can develop and plan for the stormwater management program with a more reliable and equitable source of funding that is based on the demand that a given property places on the stormwater management system. Alternative funding sources include general revenues, fees and bonds. However, general revenues are based on the value of property and not the demand placed on the stormwater system. General funds are less stable for long term stormwater management planning and programming activities. Year to year budget cycles cannot be counted on for adequate funding levels for stormwater management services. The Town has significantly increasing regulatory requirements and local needs, and prior to the utility, no increased resources were identified to meet these increasing needs.

How does/will the stormwater management program benefit residents, businesses, etc?
The stormwater management program includes various services and activities that will be expanded with the additional capacity. The following are some of the primary services and activities:

- public drainage and storm sewer maintenance, repair, and improvement
- street sweeping and cleaning
- National Flood Insurance Program (NFIP) participation
- flood mitigation activities (elevation, acquisition, floodproofing)
- water quality improvement activities (regulatory and local needs based)
- Bolin Creek Watershed Restoration Team participation
- public education and participation
- Land Use Ordinance administration
- stream repair and restoration
- Drainage Assistance Program (potential future initiative)

What is an "impervious surface"?
In general terms, an impervious surface is a hardened surface (concrete, rooftop, asphalt, compacted gravel, etc.) that does not absorb stormwater. Impervious surface areas cause increased pollutant loading, increased volume and rate of stormwater runoff, lower stream base flows, and decreased infiltration of stormwater into the soil.

Appendix 7: Links to additional information

Carrboro Stormwater homepage: http://www.townofcarrboro.org/287/Stormwater

Carrboro NPDES Stormwater Management Plan:
http://www.townofcarrboro.org/DocumentCenter/Home/View/578

Board of Aldermen Agenda on Flood Related Impacts, 2016:
https://carrboro.legistar.com/MeetingDetail.aspx?ID=456726&GUID=5CBA27D9-FD8C-4C4C-8557-81703C1CA2E7&Search=

Board of Aldermen Stormwater Retreat, 2017:
https://carrboro.legistar.com/MeetingDetail.aspx?ID=534576&GUID=2BF7B80B-BD61-481A-82C8-1373C00E0B15&Search=

The Town participates in the Clean Water Education Partnership:
http://www.nccwep.org/

NCDWR Jordan Rules: http://portal.ncdenr.org/web/jordanlazke/implementation-guidance-archive

NCDWR presentation on Jordan Rules:
http://portal.ncdenr.org/c/document_library/get_file?uuid=5aa1cee4-ed17-41c6-b601-ba3a4f2bb87f&groupId=235275

Nutrient Scientific Advisory Board: http://deq.nc.gov/about/divisions/water-resources/planning/nonpoint-source-management/nutrient-scientific-advisory-board/

Carrboro Benthic Sampling Studies: http://www.townofcarrboro.org/702/Benthic-Monitoring

Carrboro Bolin Creek Website: http://www.townofcarrboro.org/280/Bolin-Creek-Watershed-Restoration

Chapel Hill Bolin Creek Website: http://www.townofchapelhill.org/town-hall/departments-services/public-works/stormwater-management/local-watersheds-water-quality/watershed-assessments-recommendations/bolin-creek-watershed-restoration-team

The Town participated in/presented at a well-attended local symposium on “Caring for our Creeks” in 2012: http://bolincreek.org/blog/symposium-2/