Assessment of Stormwater Financing Mechanisms in New England

Final Case Study Report

Prepared for:

Massachusetts Coastal Zone Management
251 Causeway Street, Suite 800
Boston, MA 02114

Prepared by:

Charles River Watershed Association
190 Park Road
Weston, MA 02493

March 30, 2007

TABLE OF CONTENTS

Page

TABLES

FIGURES

Page

APPENDICES

1.0 EXECUTIVE SUMMARY

Many communities across New England are exploring various stormwater financing options, including the consideration of stormwater utilities, in order to address the economic challenges of improving their stormwater management programs that will meet growing regulatory requirements, reduce localized problems, such as flooding and erosion, and meet the environmental protection demands of their own residents. Charles River Watershed Association (CRWA), a non-profit environmental organization created in 1965, has been working for some time to reduce non-point source pollution to the Charles River and is keenly aware of the financial difficulties and shortfalls communities are facing for funding stormwater-related work. In an effort to help communities develop and implement appropriate mechanisms to fund their stormwater management programs, and to support the statewide assistance efforts of the Massachusetts Office of Coastal Zone Management, CRWA set out to evaluate three stormwater financing mechanisms in New England that have been adopted since 2005. This report summarizes our findings and is intended to provide guidance and assistance to other communities and agencies who may wish to expand municipal stormwater financing opportunities.

CRWA investigated the development and implementation process for stormwater financing mechanisms in South Burlington, Vermont, Reading, Massachusetts, and Newton, Massachusetts. CRWA conducted interviews with staff associated with the financing mechanism development and implementation and studied the materials each municipality prepared during this process. In addition, CRWA obtained and reviewed stormwater financing materials found on the Internet, including guidance documents, case studies, journal articles, and public education materials. These three programs, each with their own somewhat different structure, scope, and development process, are important models for other municipalities interested in pursuing the adoption of a dedicated, fee-for-service mechanism.

The City of Newton developed a simple stormwater user fee program. Of particular interest was the speed with which they implemented the program, which was accomplished in five months. The program has a simple structure, with two fee structures, one for residential properties and one for other properties. DPW staff analyzed a representative sample of residential and non-residential homes and determined that since the range of impervious areas was very small within residential property types they could charge a uniform rate for the utility. Elderly residents are eligible for a discount on the fee while a credit program is being developed for groundwater recharge best management practices (BMPs). The stormwater fee is billed quarterly in the water bills and is tied to the water meter. The stormwater program is housed within the existing engineering division of the Department of Public Works (DPW).

The Town of Reading went through a longer evaluation and program development process with DPW staff and the Water, Sewer, and Stormwater Management Advisory Committee, which included representatives from several town committees and the general public. The town relied on information obtained from high resolution ortho-photography, which was the basis for the GIS analysis of impervious area of each parcel

in town. The rate structure for single- and two-family homes is a flat fee based on the average impervious area, which also equals one equivalent residential unit (ERU). Multi-family, commercial, and industrial properties are charged based on their impervious area, which is divided by one ERU. The fees are placed into an enterprise fund, which in conjunction with funding from the general tax revenue, funds the town's entire stormwater management program. Abatements are granted for properties that install and maintain stormwater BMPs. Undeveloped land is not charged a utility and property owners receive a discount for early payment. The stormwater fee is billed quarterly in the water bills. The stormwater program is housed within the engineering division of the DPW.

The City of South Burlington went through the most complex and detailed process of the three municipalities surveyed. Their utility structure and program is fairly complex in large part because the City is large and has numerous different property types, sizes, and land uses. The City wanted to design a system and a review process that they felt would stand up in court if there were any legal challenges. There were external legal challenges to development that also helped create support for the program. South Burlington developed their utility in conjunction with DPW and Planning Department staff, a Stormwater Advisory Committee (SWAC), engineering consulting firms, and a technical advisory committee. The consultants determined the baseline budget of current stormwater activities while the SWAC determined the City's stormwater priorities and estimated a proposed stormwater budget. A technical advisory committee, comprising representatives from the University of Vermont and the Vermont Regional Planning Commission, developed an algorithm to determine parcels' impervious areas using satellite imagery. GIS was then used to analyze the data and estimate ERUs and fees for each parcel. The flat fee for single-family residential homes is based on the average impervious area, which is equal to one ERU. The flat fee for single-family homes is divided equally for two- and triple-family homes. Multi-family, commercial and industrial properties are charged based on their percent imperviousness and an assigned tier factor, which is used to calculate the number of ERUs for each property. The City offers credits for stormwater BMPs and educational programs. The stormwater utility is billed quarterly in the water bills. The city created a new stormwater division within the DPW to administer the stormwater utility and program.

From these case studies, several conclusions can be drawn about the development of a stormwater utility, such as the need for sufficient time for utility development and the benefits of basing fees on impervious surfaces and using GIS in the rate structure methodology.

2.0 INTRODUCTION

Stormwater is the main source of pollution to many urban waterways. The US Environmental Protection Agency (EPA) reports that polluted stormwater runoff is responsible for impairment of almost 40% of surveyed, impaired water bodies (US EPA 2007b). Stormwater is water that runs off impervious surfaces, such as rooftops, streets,

and parking lots, and as it flows, it picks up and carries sediment and other surface pollutants, such as bacteria, nutrients, oil and grease and trash. Without mitigation or control, stormwater runoff will pass untreated directly into waterways.

Improving the management of stormwater across the country is a priority of EPA, and of various state agencies including the Massachusetts Department of Environmental Protection (DEP) and Massachusetts Office of Coastal Zone Management (MA CZM), and non-profit groups, such as the Charles River Watershed Association (CRWA). To address stormwater pollution and improve surface water quality, EPA created and promulgated the National Pollution Discharge Elimination System (NPDES) Phase I and II Stormwater Regulations. The NPDES program requires municipalities with separate storm sewer systems in urbanized areas to develop and implement stormwater management programs that prevent pollution, minimize erosion and sedimentation from construction sites and developed areas, detect and eliminate illicit discharges, and educate and involve the public in stormwater management.

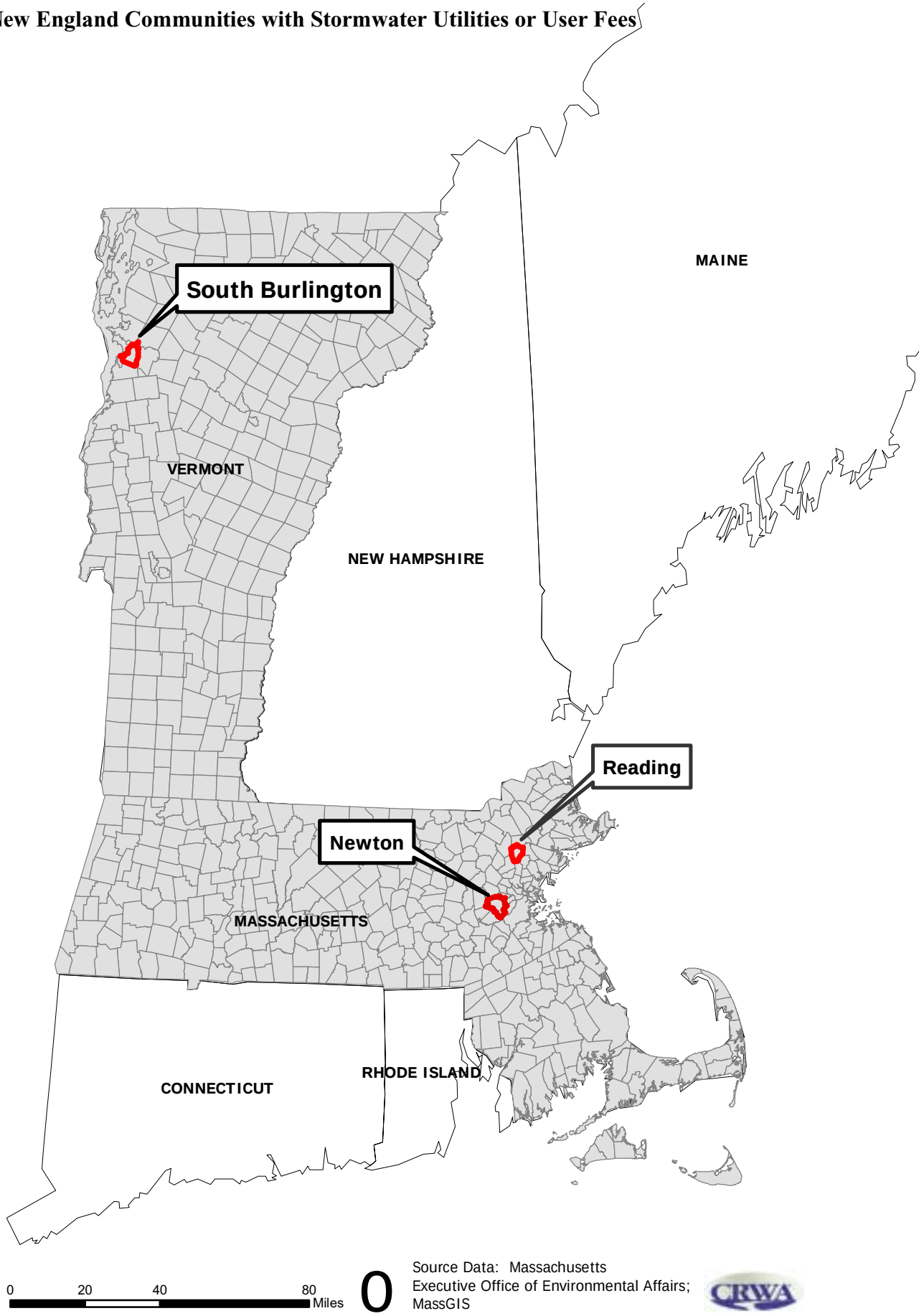
Many municipalities have initiated efforts to improve their stormwater management programs in order to meet these regulatory requirements, to reduce localized problems such as flooding and erosion, and to meet the demands from their own residents that they protect the local and regional environment. Yet these municipalities often find stormwater management programs are difficult to fund, especially given limited budgets available through the general tax fund. While many communities may currently be involved in stormwater management, they may not be addressing all of the NPDES requirements, which may necessitate additional staff time, equipment, and capital costs. In addition, ongoing development of Total Maximum Daily Load studies (TMDLs) may require municipalities to expand stormwater management programs over time in order to address specific pollutants that are contributing to water quality impairments.

Until the past year, Massachusetts municipalities have been slow to adopt stormwater utilities, relying instead on the general tax fund, or in some cases funding stormwater programs through an existing water and sewer utility. Today, some municipalities in Massachusetts are considering adopting dedicated stormwater utilities. However, many of these communities are uncertain about whether a utility is right for them. Municipalities need better basic information and guidance, to determine first whether a utility is feasible in their own community, and second what elements are most appropriate for their circumstances.

To date, only a few communities in New England have adopted dedicated stormwater funding in the form of a stormwater utility or user fee. This research focused on three stormwater utilities in New England that have been adopted since 2005: South Burlington, Vermont, the first stormwater utility in Vermont, and two municipalities in Massachusetts, Newton and Reading (Figure 1). These three programs, each with their own somewhat different structure, scope, and development process, are important models for other municipalities interested in pursuing the adoption of a utility. CRWA conducted interviews with all three municipalities and analyzed each utility to determine what worked (and what did not) in development and implementation of each of these

programs, and what key factors led to the ultimate success in establishing a utility. Based on the work and experiences of these three communities, this case study report serves as a guide for municipalities interested in or in the process of establishing stable and dedicated stormwater management funding to meet the increasing demands of the NPDES stormwater permitting program and to protect local water resources. Funding to assess stormwater utilities of three New England municipalities and to prepare this case studies report was provided by MA CZM and New England Development (NED).

Figure 1. New England Communities with Stormwater Utilities or User Fees



3.0 BACKGROUND

3.1 NPDES Stormwater Regulations

The purpose of the NPDES stormwater regulations is to "preserve, protect and improve the Nation's water resources from polluted stormwater runoff." In 1990, EPA established the Phase I rule of the NPDES stormwater program, which requires operators of "medium" and "large" municipal separate storm sewer systems (MS4s) of populations over 100,000 to implement stormwater management programs. Phase II, which was enacted in 1999, expands the NPDES stormwater program to include MS4s that were not covered by Phase I (US EPA, 2007a; 2005a). Phase II requires MS4s to design stormwater programs that reduce pollution discharge to the 'maximum extent practicable' in order to protect water quality and satisfy the requirements of the Clean Water Act.

To meet the Phase II goals, stormwater management programs must have six program elements or minimum control measures: 1) public education and outreach, 2) public participation/involvement, 3) illicit discharge detection and elimination, 4) construction site runoff control, 5) post-construction runoff control, and 6) pollution prevention/good housekeeping. EPA provides examples of actions for each criterion as guidance for municipalities, which are summarized below. The public education control measure requires the municipality to distribute educational materials to a diverse audience about stormwater pollution and steps to minimize pollution (US EPA, 2005b). The second criterion, public participation, requires public involvement in the stormwater management program through public meetings, citizen councils, or volunteer action, such as water quality monitoring, storm drain stenciling, or clean-ups (US EPA, 2005c). The illicit discharge detection and elimination control measure requires MS4s to produce a storm/sewer system map with outfalls and receiving waters. In addition, municipalities must investigate and address non-stormwater discharges, prohibit illicit discharges, and educate the public about illicit discharges (US EPA, 2005d). Construction site runoff control requires several steps to reduce runoff from construction sites to the maximum extent practicable, by implementing such practices as regulatory mechanisms, site plan reviews, inspections, and penalties for non-compliance (US EPA 2005e). Post-construction runoff control includes planning, developing, and implementing stormwater controls in redevelopment and new development with both open space planning and stormwater best management practices (BMPs) (US EPA, 2005f). The final control measure, good housekeeping, requires municipal operations and maintenance programs to prevent and reduce runoff through municipal operations, such as street sweeping and catch basin cleaning (US EPA, 2005g).

3.2 Stormwater Management Financing

Municipalities face many challenges in implementing the NPDES stormwater management requirements in terms of procedural, legal, and financial considerations. They must assess their stormwater management programs to identify current work which satisfies the NPDES requirements, additional work necessary under Phase II, and the funding source(s) to finance implementation of these program requirements. In most cases, NPDES requirements necessitate additional resources, both equipment and personnel, for stormwater control which exceed the current stormwater management budgets of many communities. Therefore, many municipalities are considering amendments to their current local regulations to allow the establishment of a dedicated stormwater financing mechanism.

There are many financing options available to fund stormwater management programs, such as bonds, state and federal assistance grants, taxes, user fees, and stormwater utilities. Each of these mechanisms has both benefits and disadvantages. There are many factors to explore when investigating stormwater financing mechanisms. For example, it is important that the fees be defensible, equitable in regards to the amount of stormwater runoff generated from each source, and acceptable to the stakeholders. In addition, the fees need to clearly reflect the benefits of a stable and adequately funded stormwater management program, which may include improved water quality, better drainage system, and reduced flooding, erosion, and sedimentation. A funding source that satisfies these requirements will potentially minimize negative responses, provide for stormwater management program costs, and help to protect and improve water quality and flow of our waterways.

3.2.1 Bonds and Grants

The use of a bond to pay for stormwater programs involves borrowing money and accruing debt. Bonds are not a stable funding source for the entire stormwater management program, but can be used to provide funds for utility start-up or to expedite the program implementation. Bonds may also be used to initiate large capital projects.

Municipalities may seek state and federal assistance by applying for grants and revolving funds. There are various federal programs that provide consulting for stormwater management, either free or as a cost share (Reese, 2003). For example, the National Park Service will provide planning assistance for river corridor development, the United States Geological Survey cooperative program will help with water quality monitoring and data analysis and the US Army Corps of Engineers may help with the Phase II permit application. Other federal agencies that provide grants for stormwater management are the U.S. Urban Housing and Development, Federal Emergency Management Agency, and EPA. However, grants from these agencies are often competitive, have specific eligibility requirements, may have a limited scope of funding that may not cover the entire stormwater program budget, and be time-limited to a few years. Massachusetts agencies that offer grants for non-point source related work include CZM, DEP and

Executive Office of Environmental Affairs. Examples of state grants include the Section 319(h) Non-Point Source Competitive Grants, which may fund stormwater BMPs.

3.2.2 Taxes

Funding stormwater management programs through general taxes remains the most common source of funding (NAFSMA, 2006). However, taxes are not dedicated to stormwater management, which has to compete for funding with other priority budgetary needs, such as police, teachers and firefighters. In some cases, general taxes may provide sufficient revenue to support the entire program; however, there are equity issues associated with taxes because they are not proportional to pollution potential. Furthermore, properties that may be exempt from taxes would then be exempt from paying for stormwater, such as schools, churches and other municipal buildings, which also generate stormwater runoff, contribute to the impairment of local waterways, and are often the largest impervious areas in the municipalities.

3.2.3 Stormwater User Fees and Utilities

The last two financing mechanisms, stormwater user fees and stormwater utilities, are closely related. User or service fees can be charged for a variety of stormwater related services, such as inspection of BMPs and permit charges (Lehner, 1999). These fees are stable, dedicated, equitable, may be sufficient to cover program expenses, and are proportional to the users pollution impacts (Morandi, 1992).

A stormwater utility provides user fee funding similar to water and sewer utilities, but creates an enterprise fund with revenue to pay for operating and maintenance expenses, project or capital-related expenditures, staffing, engineering, permitting, inspection, and program management costs. A stormwater utility is leveraged as a fee charged in exchange for a service, such as stormwater management system operation and maintenance, or construction of new BMPs. This charge is a consistent, dedicated, and equitable source of funding. Many stormwater utilities are based on factors that influence stormwater runoff, such as impervious area, which can be used in the rate setting methodology. Often, the stormwater utility is based on an equivalent residential unit (ERU), which is based on the average single-family home within the municipality, for factors that contribute to stormwater, such as the impervious area or percent impervious area.

To establish the utility, municipalities need to determine rate structure, billing mechanisms, discounts, credits, exemptions, and special fees. Common barriers to the adoption of stormwater utilities are the lack of awareness and knowledge from the public and municipal officials. The public and municipal officials may perceive that high costs are associated with the stormwater utility development and implementation. Additionally, there are fears that the visibility of the charge may raise public complaints and opposition, especially if the public interprets it as a tax.

There are over 400 stormwater utilities nationwide (Pilzer, 2003 and Kaspersen, 2000), with over 100 of these utilities in Florida alone. There are also many utilities in Washington, Oregon, California, and Texas. The first stormwater utility was created in Bellevue, Washington in 1974. The U.S. EPA reported over 100 stormwater utilities have been established since 1990. It is estimated that by 2010, there will be over 2,500 stormwater utilities nationwide (Kaspersen, 2000).

4.0 CASE STUDIES OVERVIEW

The overall goal of this report is to provide information and analyses about three fairly new stormwater utilities in New England that will help promote the creation and adoption of other stormwater utilities in Massachusetts and beyond. This case study report will aid municipalities in determining whether or not to proceed with a utility, and will also function as useful educational and advocacy tool should they decide to do so.

CRWA's research on existing stormwater finance mechanisms focused on the New England region. Compared to the creation of stormwater utilities nationwide, New England is lagging far behind. Although several New England towns are researching or are in the process of developing stormwater financing mechanisms, less than five communities have actually implemented one as of February 2007. The communities that have adopted a stormwater utility include Lewiston and Augusta, Maine; Newton and Reading, Massachusetts; and South Burlington, Vermont. Additionally, Chicopee, Massachusetts considered a stormwater utility but eventually adopted a stormwater user fee in 1999.

CRWA analyzed the stormwater utilities of South Burlington, Vermont; Newton, Massachusetts; and Reading, Massachusetts. This analysis includes a description of the process and steps taken by each community to develop their dedicated stormwater management funding mechanism; initial outcomes of implementing the stormwater user fee; feedback received from the public on the fee; and the communities' efforts undertaken with funding from this dedicated source to improve stormwater management. CRWA met with the stormwater official(s) of each community to obtain information on the utility billing process, rate setting methodology, driving factors for developing a stormwater utility or user fee, and public involvement in the utility development. CRWA also discussed how the newly generated funds are being allocated to stormwater-related work. In addition, CRWA reviewed municipal documents prepared in support of the development, adoption and implementation of the stormwater utility.

CRWA prepared a questionnaire that focused on several main categories regarding the development and implementation of the stormwater utility and served as an informal guide for the discussions with the municipalities (Appendix A). CRWA first gathered background information about each community and their stormwater management program prior to the utility, such as structure, budget, and operations. In discussing the stormwater utility development, CRWA investigated the public education and outreach, political process, and major players involved. CRWA also inquired, in detail, about the

process of developing and implementing the rates, including the data requirements, rate setting methodology, billing system and process, credits, discounts and exemptions. The communities discussed the public response to their utility and the challenges and lessons learned in the process of both development and implementation. These interviews were digitally recorded, transcribed and served as the basis for this case study report (Rose, 2007; Delaney and Honetschlager, 2007; Hinds and McDonough, 2007).

5.0 CASE STUDIES

5.1 Newton, Massachusetts

The City of Newton developed their stormwater utility in 2006. They achieved this in five months from start to finish, the shortest time of the three programs we studied. The City adopted a simple flat fee structure.

5.1.1 Community Profile

The City of Newton has the largest population and land area of the three municipalities investigated, see Table 1. Most of Newton is developed land, with the primary land uses being residential, commercial and industrial (Figure 2). Newton is located in the Charles River watershed and drains directly to the river. The four major tributaries are: Sawmill Brook, Cheesecake Brook, Laundry Brook and South Meadow Brook. In addition, Hyde, Cold Spring, Country Club, and College Brooks also drain into the Charles River (Figure 3). Newton has an extensive stormwater drainage system, which includes 12,750 catch basins, 307 miles of drainage pipes, and 108 outfall pipes to the Charles River. A drainage map for Newton is included as Appendix B. Newton estimates that the annual precipitation of 41 inches/year generates approximately 12.6 billion gallons of stormwater runoff/year.

Table 1. Newton, Massachusetts Community Profile

Population	Land Area (sq. mi)	Watersheds	Stormwater-Related Issues	Primary Land Use	Percent Imperviousness or Developed Land
83,829	18.1	Charles River; Four Brooks – Sawmill, Cheesecake, Laundry, and South Meadow	Poor water quality, flooding, illicit connections	High and medium density residential, industrial, commercial	55.03%

[1] Based on US Census, 2000

Newton experiences many water quality and flooding problems associated with stormwater runoff prompting the need for better and more effective stormwater management. Localized neighborhood flooding is especially troublesome due to poorly maintained and failing drainage infrastructure, such as broken pipes, clogged catch basins

Figure 2. Newton Land Use Map

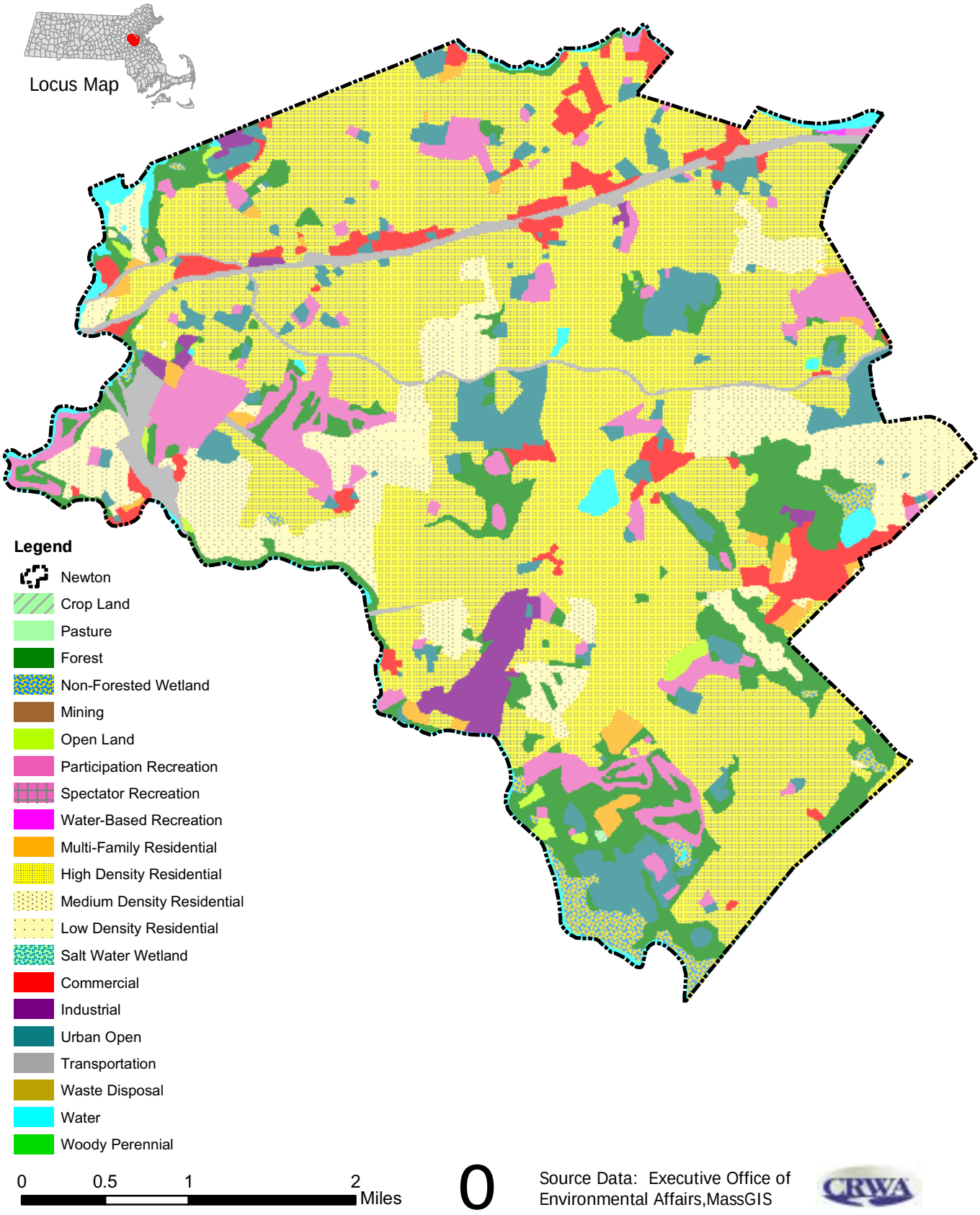
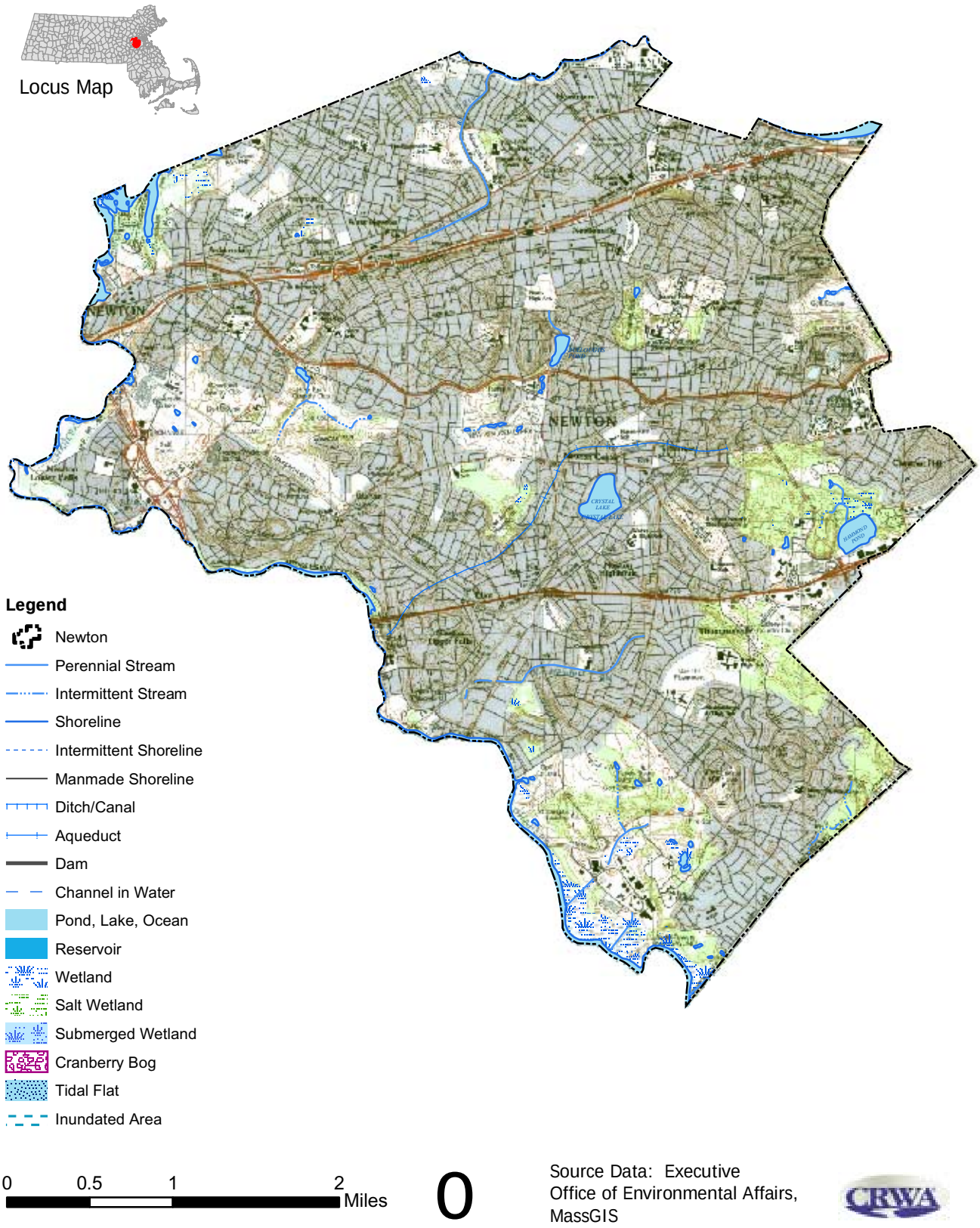


Figure 3. Newton Hydrography and Drainage Map



and non-functional trash racks. In 2004, Newton received an administrative consent order from EPA to identify and eliminate suspected illicit discharges that are impairing local water quality. Several outfalls are currently being monitored by the city for elevated bacteria concentrations. All of these issues led Newton to take a proactive approach to addressing stormwater problems by developing and implementing a stable, fair and acceptable mechanism for funding their stormwater management program.

5.1.2 Stormwater Management Structure and Budget Prior to Utility

The city's stormwater management program is located within the Department of Public Works (DPW). Before the creation of the stormwater utility, various divisions of the DPW were addressing water, sewer and drainage issues without any dedicated funding. The city was unable either to assign a Newton staff member to the management and overall coordination of stormwater-related activities by the different city divisions or to oversee the new Phase II stormwater permitting requirements. Instead, these permitting requirements were passed between DPW engineering staff with the majority of work being delegated to the city permits engineer.

Prior to adopting the stormwater utility, Newton DPW prepared a minimum needs assessment for the stormwater program and the minimum budget necessary to carry it out, which was used to calculate the utility rates during the initial phase of the development of the stormwater utility. The minimum budget for FY07 equaled $765,000 and includes funding for personnel salaries and training, water quality sampling, illicit discharge investigation, corrective actions, public outreach, pollution prevention and maintenance projects (See Appendix C for the Newton Rate Structure Narrative). The stormwater budget prior to the development of the utility was approximately $375,000.

5.1.3 Stormwater Utility Development – Political Process and Public Education

To adequately meet the requirements of Phase II and better coordinate city stormwater activities, the permits engineer and the DPW director believed that a new, dedicated staff person was necessary and that this new position, and that the stormwater management program should be funded by a dedicated source, namely a stormwater utility. Table 2 presents an overview of the stormwater utility development.

In early 2006, the stormwater utility was proposed by the DPW and approved within five months by the Board of Aldermen. The political process for adopting the stormwater utility was initiated in February 2006 with a presentation, entitled the 'State of Stormwater,' given to the Stormwater Sewer Committee/Task Force. The presentation included a description of the city's current stormwater functions, local stormwater and drainage issues and the federal regulatory requirements and legal obligations to address stormwater pollution. The City asserted that the best way to address these needs was dedicated staff and funding. By highlighting the legal, financial and environmental challenges faced by the city, this presentation became the catalyst for pursuing the stormwater utility. DPW delivered further presentations on the concept of a stormwater

utility to the Public Facilities Committee (PFC), a sub-committee of the Board of Aldermen. In the first presentation, DPW staff asserted to the PFC that without developing and adopting an adequate, dedicated funding source for stormwater management, the city would be faced with two potential scenarios; either a tax override to increase revenue or further EPA fines for impaired water quality due to illicit discharges. Since these scenarios were so unfavorable to the committee members, the PFC was supportive of the stormwater utility and suggested ways to strengthen and improve the presentation before the next meeting. The DPW then made a second presentation at a PFC meeting where the full Board of Aldermen was invited to attend. The Newton stormwater utility presentation is included in Appendix D.

The political process culminated in two meetings of the full Board of Aldermen in May 2006. The Board of Aldermen voted twice on the adoption of a stormwater utility. The first vote was close and the utility passed. However there were a large number of absentee aldermen during the first vote and a second vote was taken at a follow up meeting. At this meeting, DPW staff further explained the rate structure rationale and methodology to the Board of Aldermen to ensure acceptance of the utility. This guaranteed that the aldermen fully understood the problems associated with stormwater, alternative solutions, and design of the rate structure, which would help them explain the utility to their constituents. The second vote passed the utility 18 to 4.

After the Board of Aldermen voted a second time in approval of the utility for the FY07 City Budget, city lawyers amended the City of Newton ordinances to create a stormwater use charge and establish the rate for FY07 (Appendix I). These rates are controlled by the Board of Aldermen and will be reviewed annually for necessary changes.

During the development of the utility, Newton educated the public on stormwater and the concept of a utility, which helped to facilitate public acceptance of the utility. Their outreach included several articles in the local newspaper, *Newton Tab*, which are included in Appendix D, and stormwater information on their website, http://www.ci.newton.ma.us/dpw/engin/stormwater.htm. In addition, a local college student prepared a five-minute video segment about local stormwater issues and the proposed utility, which aired on local cable television, Newton News. Prior to the first stormwater bill, Newton sent out an insert in the water bill announcing the utility, with costs and an explanation (Appendix D).

CRWA and EPA-New England undertook several efforts to show their support for the utility and aid in its acceptance. Both CRWA and EPA-New England wrote letters to the DPW director in support of the stormwater utility in April 2006. CRWA's letter described the work of CRWA, and its interest in Newton, which drains to the Charles River with many untreated outfalls. The letter then addressed the benefits of a stormwater utility to both the Charles River and Newton residents. The EPA letter encouraged a utility as a dedicated funding source for failing infrastructure

Table 2. Newton Stormwater Financing Mechanisms Development Considerations

Fee Enacted/ Bills Sent Out	Develop-ment Period	Public Education	Approval Process	Start-Up Strategy	Fee Structure	Multi-Family Approach	Fee Basis and Data Collection	Organizational Structure	Fee Collection
May 2006/ August 2006	Five months	Local newspaper articles; stormwater section on website; video segment for local cable TV; stormwater insert in water bills	Stormwater/ sewer committee; Public facilities committee (subcommittee of Board of Aldermen); Board of Aldermen	Simplified fee structure	Flat rates for residential and non-residential properties	Treat as single family but billing tied into number of water meters	Median lot size and impervious area based on representative samples of residential and commercial properties	Within Department of Public Works (DPW) and existing water and sewer utility	Use water and sewer bills and tied into number of water meters

and increasing awareness of local stormwater issues and ways for the public to help. In May 2006, CRWA sent out an email action alert to all CRWA members who are Newton residents. This action alert contained basic information about the proposed stormwater utility, including rates and billing structure. CRWA expressed their support and encouraged Newton residents to call their aldermen to encourage adoption of the stormwater utility. The action alert directed Newton residents to the CRWA website, which contained several pages dedicated to the Newton stormwater utility. These pages included a list of aldermen, their contact information and suggested stormwater talking points. These talking points encouraged the residents to acknowledge their support of the Charles River, recreation areas along the river, and stable funding to address stormwater concerns such as neighborhood flooding, impaired fish and wildlife habitat, and water pollution. Most importantly, CRWA suggested that residents indicate their belief that the stormwater utility was fair and they were willing to pay it. Appendix E includes the CRWA letter of support, EPA letter of support, and CRWA action alert.

5.1.4 Stormwater Utility Rate Structure

Rate Structure Methodology

Initially, Newton turned to the DPW legal staff and the Newton City Solicitor to ensure that their utility rates are legal under the recently enacted Massachusetts Stormwater Management Bill implemented via amendments to existing legislation, MGL Chapter 83 (MGL Chapter 149, Sections 135-140, 2004). With the aid of these legal advisors, Newton determined that legally there were two types of rate setting mechanisms; either uniform rate or uniform unit rate. With a uniform rate, everyone in a certain category pays the same rate. With a uniform unit rate, everyone pays the same rate per unit, so their rate is based upon their units (i.e., $ per impervious area).

Newton decided to use a uniform rate structure for two types of properties; 1) residential properties including single-family and larger and 2) non-residential properties, which includes commercial and industrial. These uniform rates were established using a simple flat fee structure based on median percent impervious areas for residential and non-residential properties. To justify this rate setting methodology, Newton assessed statistically significant representative sample sets of residential and commercial properties, which included a range of property sizes. For the representative sample, Newton's environmental engineer accessed Newton's assessing database to determine lot and structure sizes for the residential properties. For the commercial properties, the environmental engineer utilized aerial photography to measure the undeveloped land on the parcel to calculate percent impervious area. For all property types, the environmental engineer verified the initial assessment of impervious area (either from the assessing database or aerial photography) by physically measuring driveways and parking areas.

Residential lot sizes from the representative sample for single-family and two-family homes ranged from 4,421 to 32,850 square feet (ft^2) while the representative sample lot sizes for commercial and industrial properties ranged from 30,000 to 125,325 ft^2. For

each property, Newton assembled data on lot size, total impervious area, and percent impervious area of lot size and then calculated two measures of central tendency for each property type, the arithmetic mean and the median. Although the data revealed a range of impervious areas for each property type, the mean an the median were not significantly different for both residential and non-residential properties (i.e., residential median percent impervious area and mean percent impervious area equaled 31% and 33%, respectively, with a relative percent difference of 6%), which indicated that there is little distinction between percent imperviousness of small and large lot sizes and that they can be treated equally. This statistical comparison was the rationale for using a uniform rate for residential and commercial properties.

Newton then referred to the representative sample statistics to determine the utility rate structure. The city used the median residential impervious area for a median residential lot size, 3,119 ft^2, as the base unit of measure or the Equivalent Residential Unit (ERU). Thus all single-family and two-family lots are assessed one ERU. On the other hand, commercial and industrial properties are assessed six ERUs because the median impervious area of a median commercial lot, 18,587 ft^2, is approximately six times the impervious area of the median residential lot.

The rate for one ERU was calculated by using a projected revenue target of $700,000 in FY07 for stormwater-related salaries, expenses, and capital improvements and the number of residential (23,762) and commercial (848) water/sewer accounts in the city (the approach to billing is discussed further below.). The payment for a residential property equals $25.00 per year, which was rounded up from $24.26 per year to take into account a 3% reduction in fees due to non-payments, discounts and abatements. The commercial rate equals $150 per year, which is six times the yearly residential rate. For a summary of the rate structure, see Table 3.

Because there is no historical data to verify the anticipated revenue from the stormwater utility, the DPW assumed a conservative budget estimate for FY07 and reduced the anticipated revenue to $575,000 for the first year of the utility. The modified FY07 revenue is described further below in the stormwater utility implementation section.

Discounts, Abatements, and Exemptions

Currently, the only stormwater user fee reduction available is a 30% discount for elderly residential property owners. Since the stormwater utility is tied to the water bills, the existing elderly discount for water utilities applies to the stormwater utility as well. Although there is no abatement option for FY07, the first year of the stormwater utility, Newton anticipates establishing one in FY08 with an application process for stormwater recharge BMPs (Draft credit information is in Appendix G). Currently, the City policy requires property owners who build additions to capture and recharge the additional stormwater runoff from the new impervious area to control runoff volumes and mimic pre-development conditions. Any property owner who follows this policy will be able to apply for an abatement. The engineering department will review the abatement application, inspect the development to assess if the stormwater recharge systems are

functioning correctly and then grant the appropriate abatement. The abatement percentage will be based on the volume of stormwater recharged from impervious areas.

Tax-exempt properties, such as schools, non-profit organizations, and churches, are required to pay the stormwater utility fee since these properties also generate stormwater runoff.

Table 3. Newton Stormwater Financing Mechanism Rate Structure and Budgets

Property Characteristics		Equivalent Residential Unit (ERU)	Rates		Exemptions or Discounts	Credits	Anticipated FY07 Storm-water Program Revenue	FY07 Stormwater Budget Expenses
Residential	Non-Residential		Residential	Non-Residential				
Median lot size = 10,062 ft^2 Med. impervious area (IA) = 3,034 ft^2	Med. lot size = 19,565 ft^2 Med. IA = 19,138 ft^2	1 ERU = 3,034 ft^2	Single, two-family, and multi-family = $6.25/qtr or $25/yr	Commercial and industrial = $37.50/qtr or $150/yr	Discount - Elderly (30%); Exemption – Properties on septic systems	Not in effect; Anticipates FY08 credits for recharge BMPs	$575,000	FT stormwater engineer, pollution prevention, maintenance/ drainage projects, water quality sampling, investigations and corrective actions, personnel training, public education and outreach

5.1.5 Stormwater Utility Billing, and Administration

The Newton stormwater utility is an enterprise fund that exists within the Department of Public Works. It has a simple, flat fee structure for both residential and commercial properties. Billed quarterly, the first round of bills was sent out in August 2006. In FY07, all residential properties with a water meter are charged $6.25 per quarter or $25 per year. Commercial and industrial properties are charged $37.50 per quarter or $150 per year. These rates are determined by the Board of Aldermen and will be reviewed annually.

Establishing the billing system for the stormwater utility was one of the most challenging components of implementing the utility. The fee is administered through the water and sewer bill so each residential water meter is assessed one ERU and each commercial water meter is assessed six ERUs. In the case of multi-family complexes, they receive a bill for each water meter, and not the amount of impervious area or pollution potential. For example if a multi-family home has six water meters, they will be charged six times the single- and two-family residential rate of $25 per year.

5.1.6 Stormwater Financing Revenue and Expenses

The City of Newton anticipates that stormwater utility revenue in FY07 will generate $575,000, a conservative estimate compared to the original projected revenue of $700,000, but a more prudent amount to assume for the first year of the utility. This revenue shall fund all aspects of the city's stormwater management program, including stormwater personnel salaries, pollution prevention measures, operation and maintenance of BMPs, receiving water quality sampling, public education and outreach, illicit discharge investigations, and new capital stormwater remediation projects.

The personnel involved in the stormwater program include one full-time environmental engineer and four dedicated laborers. The time of the environmental engineer is split equally between administrative duties; permitting including report writing, project design and implementation; and public education. He/she also coordinates the stormwater management efforts of the various DPW divisions including utilities, engineering and environmental affairs. The environmental engineer works with residents to address local flooding issues through stormwater management. The four laborers perform functions related to pollution prevention, such as street sweeping and cleaning of catch basins and detention basins, and maintenance and repair of drainage infrastructure, such as collapsed storm pipes.

The City of Newton is working on several stormwater remediation projects that are partially supported by revenue from the new stormwater user fee. The first project, the Hammond Pond Stormwater Management Plan, will be completed in summer 2007. The project elements include two 45 foot long sand filters and five bio-retention facilities, which will capture and filter the stormwater generated from the parking lots of the Chestnut Hill Shopping Center. These BMPs were carefully selected because of their capability to trap sand from winter deicing applications and the on-site snow storage area

and remove other pollutants including pathogens from resident waterfowl and oil and grease, metals, and other toxics associated with automobiles. Newton received a State Section 319 grant to finance the engineering design and capital expenses, a majority of the total project costs while a portion of utility revenues were used as a grant match of almost $100,000 of in-kind services. This match includes the time of the environmental engineer to aid in project design and planning and construction management.

The second project is near the city-operated Crystal Lake swimming area. The Conservation Commission and Department of Parks and Recreation have been combating uncontrolled stormwater runoff to the lake for several years. This stormwater is the leading cause of water quality impairment and leads to violations of the state swimming standards for bacteria. Currently, runoff from a large parking lot drains untreated stormwater into the lake. The proposed project design calls for the installation of trench basins and bio-swales on the parking lot to treat the stormwater runoff before it discharges into the lake. The design and construction of this project will be conducted in-house with funding from the stormwater utility. This project is still in the planning stages, due to complications with neighboring properties, but construction is slated for spring/summer 2007.

The DPW also spends a portion of the stormwater utility funds on repairing failing drainage infrastructure and anticipates one to three rehabilitation projects each year.

5.1.7 Stormwater Utility Implementation

Newton prepared several pieces of public education, which are described in Section 5.1.4, to help the public understand the stormwater utility before adoption by the Board of Alderman. Upon the implementation of the utility, Newton prepared a frequently asked questions (FAQs) brochure about the stormwater utility and a "Storm Drain Fee" insert sent out with the first stormwater bills in August 2006, see Appendix D. In part due to the city's public education efforts both before and at the onset of the new fee, as well as the relatively small amount of the fee, Newton has received very few complaints about the utility in the first five months of its first year. Any questions or complaints that arise from the public are addressed by the environmental engineer who serves as the stormwater management program contact.

Since the implementation of the stormwater utility, CRWA wrote a Newton Tab article in February 2007 as an overview of stormwater, the utility, and projects undertaken with utility revenue. The article commended Newton for creating a stormwater utility which increased public awareness of local stormwater problems and of the challenges faced by the City including failing infrastructure. CRWA explained, from an outside perspective, how basing the stormwater utility on impervious area was equitable since impervious area is directly related to the property's pollution potential.

The DPW's consultation with city and state lawyers also prevented any legal difficulties in implementing the stormwater utility especially since they were consulted early in the development process to ensure the legality of the utility and rate structure under

Massachusetts law. The city's lawyers also amended the city's ordinances to create a sewer/stormwater use charge and establish the rates.

5.1.8 Challenges, Lessons Learned, and Unique Features

The main challenges that the City of Newton experienced were related to the limited amount of time spent developing the stormwater utility. Due to the short-time frame, the city devised a simple fee structure and uniform rates for only two types of properties: 1) single, two, and multi-family residential properties and 2) commercial/industrial (non-residential) properties. Currently all residential properties are charged the same flat fee, whether they are single-family or larger. While in the case of single- and two-family residences, it is appropriate to charge the same flat fee because of the relatively small differences in imperviousness, multi-family residences tend to have higher impervious areas and generate higher stormwater volumes. The city decided to aggregate all residential properties into one category for ease of implementation of stormwater bills that are tied to the water meter and not the parcels. This was another significant factor that led Newton to use a uniform rate. Although this rate structure is somewhat inequitable, multi-family properties typically have more than one water meter so pay a higher fee.

Although the average percent impervious area for non-residential was 93% and the median was 95%, the square footage of impervious area can vary widely between properties of different lot sizes. For non-residential properties, a tiered or uniform unit rate structure based on the amount of impervious area for each property may have been a more appropriate rate setting structure since a clear connection can be drawn between impervious area and the volume of stormwater runoff generated from a property. For example, although the percentage of impervious area may be 93% for both a huge mall and a small local camera shop, the actual amount of impervious area can be significantly different. Yet with the current rate structure, both properties are charged the same rate regardless of the estimated stormwater runoff volume. This inequality in the commercial and industrial rate is one of the major issues to resolve for the Newton stormwater utility.

Billing was a major challenge to implementing the new stormwater user fee and resulted in a two month delay in sending the first bills to property owners. Because the stormwater user fee is administered through the existing water meter(s) of each property, the antiquated water billing system had to be reconfigured to include a new type of fee, which proved to be more challenging than originally anticipated. Unable to resolve the issue in-house, the city contracted the billing software company to reconfigure the program and train staff.

The short development time frame of Newton's stormwater utility was atypical. However, the City of Newton successfully demonstrates that it is possible to 'fast-track' the utility development and implementation, by doing all the work in-house. Newton was able to develop the utility, charge owners a minimal fee yet adequate fee, and generate dedicated funding for their stormwater management activities that will improve water quality and reduce flooding.

5.2 Reading, Massachusetts

5.2.1 Community Profile

Reading, Massachusetts is located in northeastern Massachusetts, see Figure 1. The Town of Reading is approximately 10 square miles with a population of nearly 24,000. Although Reading is fairly developed with commercial, industrial and residential land uses, there are still large areas of forests, wetlands, and open spaces. Figure 4 is a land use map for the Town of Reading. The city drains into three watersheds: Aberjona, Ipswich and Saugus Rivers (Figure 5). Table 4 highlights the community description.

In addition to the Phase II requirements, Reading was motivated to adopt a stormwater utility based on poor surface water quality. Flooding was especially a problem in many neighborhoods due to poorly maintained drainage infrastructure, clogged catch basins and filled drainage ditches. In addition, there is severe erosion and sedimentation in all three rivers: Aberjona, Ipswich and Saugus.

Table 4. Reading, Massachusetts Community Profile

Population[1]	Land Area (sq. mi)	Watersheds	Stormwater-Related Issues	Primary Land Use	Impervious Area (sq. ft)
24,145	9.9	Aberjona, Ipswich and Saugus Rivers	Poor water quality, flooding, erosion and sedimentation	Forest, medium density residential, commercial	27,559,304

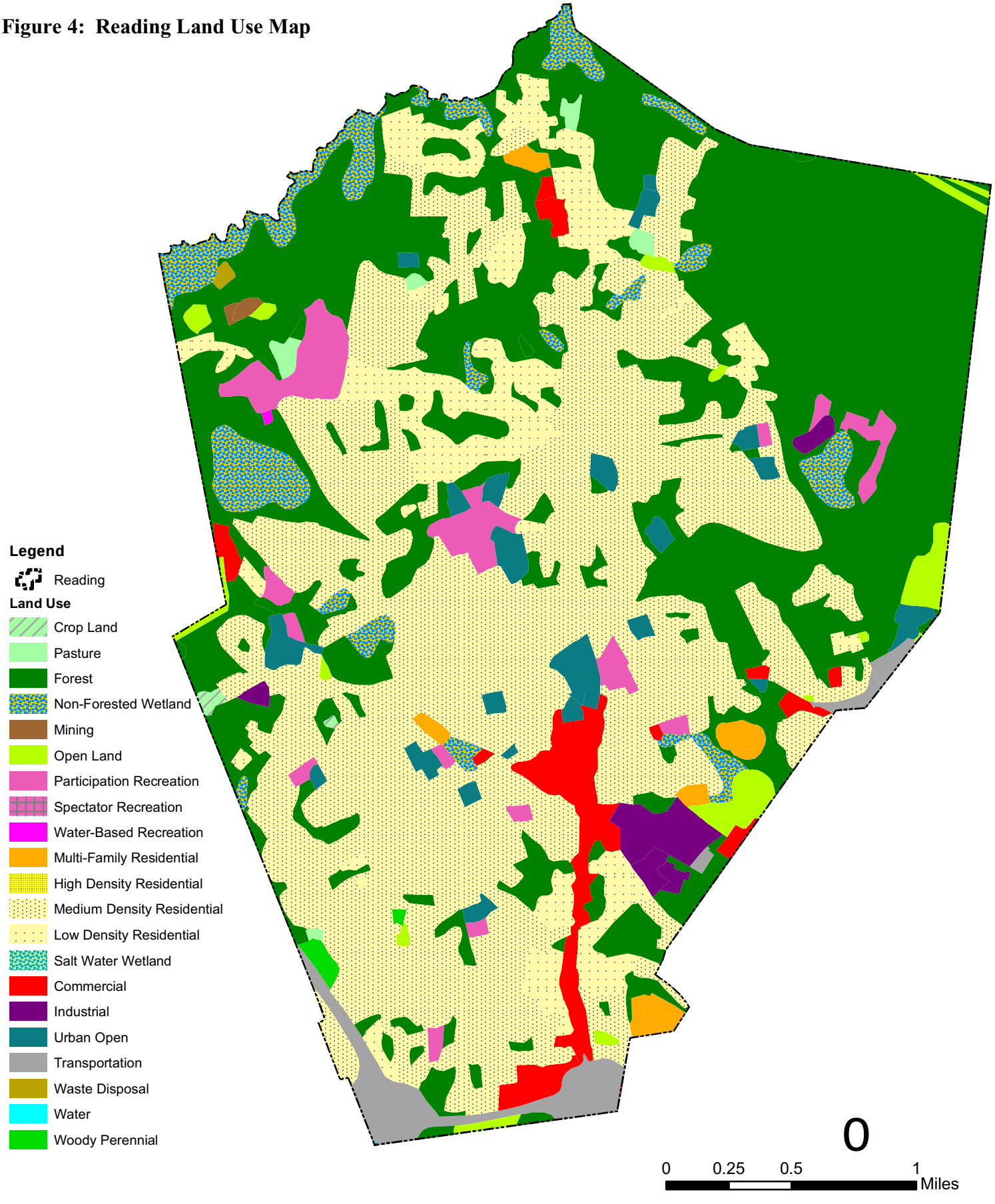
[1] Based on US Census, 2000

5.2.2 Stormwater Management Structure and Budget Prior to Utility

Reading's stormwater management program is located within the DPW and headed by the town engineer who is supported by a staff of six DPW employees. The town divisions and departments involved in stormwater-related work include the Highway, Engineering, Finance, Technology, and DPW Administration Divisions as well as the Health Department.

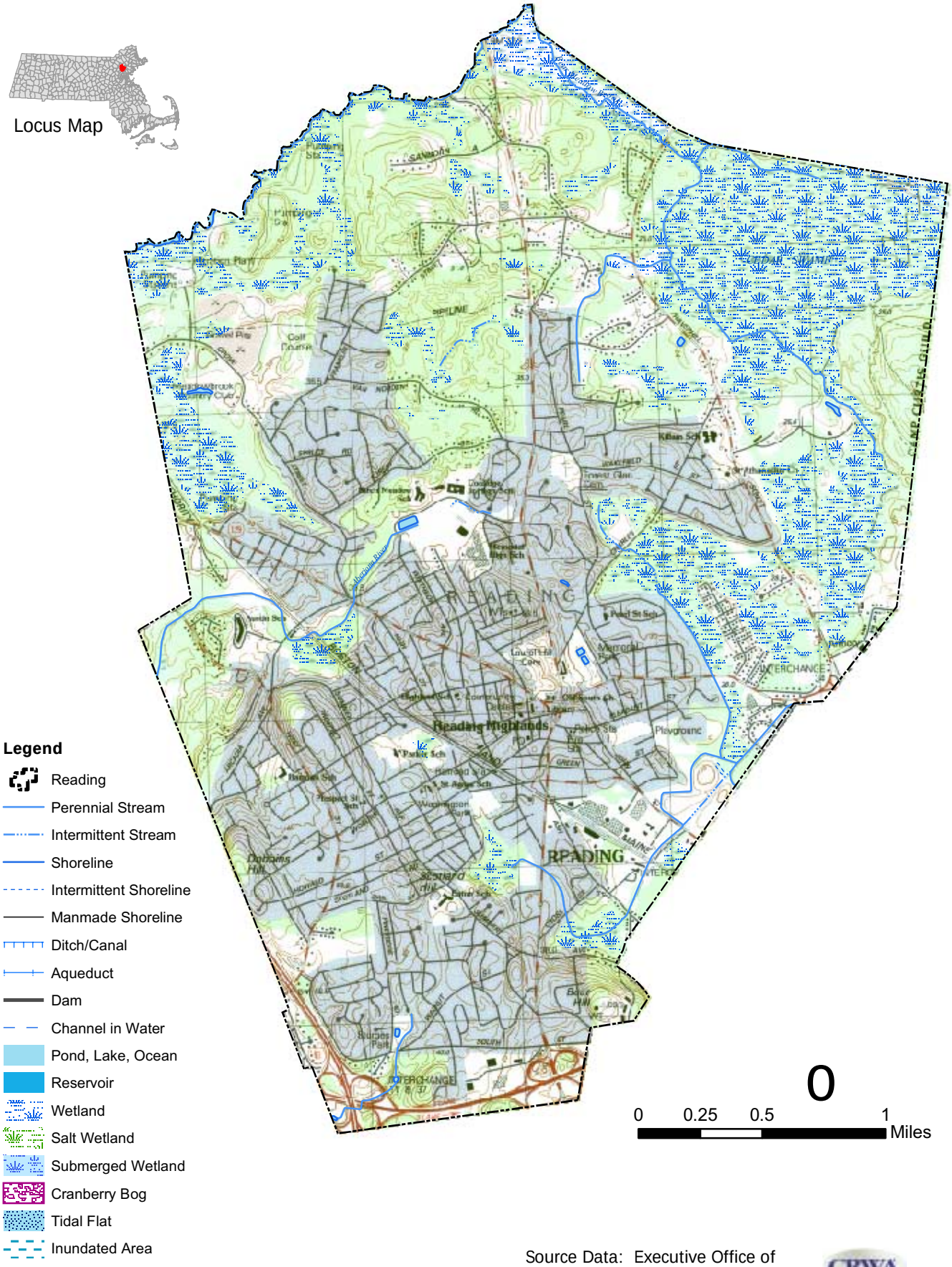
Prior to receiving revenue from the stormwater enterprise fund, stormwater-related work was funded solely by the general fund and was limited to catch basin cleaning, street sweeping, drainage ditch maintenance, and other general tasks. The town had little or no funding available from the general revenue stream to pay for the additional stormwater management control requirements of EPA and DEP (i.e., illicit detection and elimination, storm sewer mapping, public education, etc.).

Figure 4: Reading Land Use Map



Source Data: Executive Office of Environmental Affairs, MassGIS

Figure 5. Reading Hydrography and Drainage Map



Source Data: Executive Office of Environmental Affairs, MassGIS

The Reading Water, Sewer and Stormwater Management Advisory Committee (WSSMAC), as part of their investigation into the development of the stormwater enterprise fund (discussed further below), determined the costs associated with the NPDES Phase II Stormwater Regulations. The costs included Reading's current and projected expenses for stormwater management. The total estimated cost of the program, which includes operating costs, capital costs, and expenses, is $540,350 a year. The estimated operating cost is $202,750 for personnel costs in all the divisions mentioned above. Capital costs for drainage-related equipment and projects and other projects, including equipment for street sweeping and catch basin cleaning, drainage system mapping and river improvements, were estimated at $285,000. Another $52,600 is allocated to the following items under the expense category: contract street sweeping and vacuum truck rental, consulting services, vehicle parts and general materials and supplies. The stormwater budget prior to the utility was approximately $165,350. A copy of the FY07 budget is included in Appendix F.

5.2.3 Stormwater Utility Development- Political Process and Public Education

Table 5 shows an overview of Reading's stormwater financing development considerations. The stormwater utility development process was spearheaded by the former town engineer and took over three years. At the onset of the Phase II NPDES regulations in 1999, the town engineer began to research stormwater management and financing over the internet, attended stormwater management seminars and read relevant publications. Based on research into utility implementation, an ad-hoc stormwater committee comprised of town employees and officials and residents was created to investigate the current stormwater budget and activities, and the requirements of Phase II and financing options. The single most important recommendation made by the committee to the Reading Board of Selectmen (BOS) was that the town should develop a dedicated funding source for stormwater management. In response, the BOS added oversight of NPDES Phase II Stormwater Regulations, including investigation into the development of a stormwater enterprise fund, to the existing sewer and water advisory committee and renamed the committee, the Water, Sewer, and Stormwater Management Advisory Committee (WSSMAC). The WSSMAC included members of the following committees: selectmen, planning board, conservation commission, finance, and the water and sewer advisory committee. In addition, there were two at-large members from the general public. The diversity of community participation in WSSMAC satisfied the NPDES requirements for public involvement. Additionally, having various viewpoints to address stormwater management issues and create a dedicated funding source created a stronger utility proposal.

Table 5. Reading Stormwater Financing Mechanisms Development Considerations

Fee Enacted/ Bills Sent Out	Develop-ment Period	Public Education	Approval Process	Start-Up Strategy	Fee Structure	Multi-Family Approach	Fee Basis and Data Collection	Organizational Structure	Fee Collection
June 2006/ Sept. 2006	Three years	Board of Selectmen presentations; stormwater newsletter; utility information on website; info in "Reading Notes;" local newspaper articles; info in "Your Community Connection" sent to every residence	Water/sewer/ stormwater management advisory committee; Board of Selectmen; Town Meeting	Refined fee structure	Flat rate for residential; variable rate for non-residential	Treat entire complex as a non-residential property	Average impervious area	Within DPW and existing water and sewer utility	Use water and sewer bills

WSSMAC prepared a report of their findings for the BOS and other decision makers. This report advocated for a dedicated source of stormwater funding through an enterprise fund and also proposed a rate setting methodology, see Appendix C. WSSMAC investigated the costs associated with the proposed stormwater program, NPDES requirements and the rate setting methodology. In their report of the stormwater utility presented to the Board of Selectmen in August 2005, the WSSMAC proposed full funding of the stormwater program from the enterprise fund. This report is included in Appendix C.

Unfortunately, the WSSMAC discussions of dedicated stormwater management and rate setting took over a year and a half to finalize. At that point, several members of the board of selectmen had changed as did the general attitude of the board about the stormwater utility. This attitude change was one of the reasons Reading chose to fund their stormwater program through a hybrid funding system. Instead of funding stormwater solely through the enterprise fund, the funding was divided between the enterprise fund and the general fund. This compromise reduced the cost per household of the stormwater management plan by $20 to a more acceptable charge. Practically, all the stormwater activities that Reading was already doing, such as street sweeping and catch basin cleaning, were to continue to be funded under the general fund. New requirements under NPDES Phase II would be funded out of the new enterprise fund.

In the utility development, DPW and WSSMAC were acutely aware of creating a utility that was defensible, equitable and transparent. When determining the rate structure, DPW staff required of themselves that they be able to explain and justify all of the bills through GIS data. The use of GIS data, with rigorous quality assurance, led to the conclusion that the rate structure should be based on average impervious area. WSSMAC presented this methodology in their report. This was motivated by local public outcry and from reviewing national utilities that had been developed and then rejected for legal reasons. Additionally, the town adopted a transparent approach to the development of the utility. The proposed stormwater budgets were readily made available to the decision makers to alleviate some fears that the town was hiding costs that would only be revealed once the utility was approved.

Political Process

The approval of the stormwater utility must come from the Board of Selectmen, five at-large members, and Town Meeting members. In general, both town government decision-makers are supportive of ways to remove municipal expenses from the general tax budget and finance them through alternative means. Despite the consensus view among the Board of Selectmen that a stormwater utility was unfavorable and a general agreement that there were no other alternatives, the selectmen approved the recommendation of establishing a stormwater enterprise fund and charged the WSSMAC with fully developing the fund so it could be brought to Town Meeting for approval. The Board of Selectmen determined that Reading's stormwater management program should be funded through a hybrid of a stormwater utility enterprise fund and a portion of the general fund. This compromise was decided by the board in an attempt to reduce the cost

of the stormwater utility to the public. The budget allocations between the two funds are based on stormwater activity prior to the utility adoption. The general fund is used to finance stormwater activities that were already being done by DPW and the Highway Department before the stormwater utility. The enterprise fund is used to finance any new costs required under the NPDES Phase II.

An elected town meeting, as opposed to an open town meeting, proved to be an advantage in approving the stormwater utility. Some members of town meeting have served ten to fifteen years and were highly aware of the stormwater and drainage issues and that stormwater capital costs had been proposed and rejected yearly in favor of funding other priorities, such as teachers, police officers and firefighters. DPW presented the idea of a stormwater utility in several stages over the course of two years. The DPW first introduced the stormwater problems and the basics of Phase II Stormwater Regulations and mentioned that the town would be pursuing a funding mechanism so that the decision makers were aware that a stormwater financing decision would be on the horizon. Delays in the stormwater utility implementation occurred during the town meeting approval process. DPW had the stormwater proposal reviewed separately by the city counsel and Massachusetts Department of Revenue to ensure legality and equity. This was conducted before the final presentation to Town Meeting. Reading town meeting members approved the utility in April 2006 with at least a two-thirds majority, as required by town law.

Public Education

There were several facets of public education during the development of the stormwater utility. There were many presentations, primarily to the various decision making boards, such as the WSSMAC, the Board of Selectmen, and Town Meeting. A total of 12 presentations regarding stormwater-related issues were made to the BOS over the three-year development period. An example of the presentation is included in Appendix D. DPW conducted some public education and outreach on local stormwater issues, town management efforts, and ways the public can help to mitigate its impact. DPW created a stormwater newsletter for the public, beginning in March 2006, which is included in Appendix D. Information about stormwater and later, the utility, are also presented on the town website; a Reading on-line publication of town notes, “Reading Notes”; a publication called “Your Community Connection”, which is sent to every residence; and in several articles in the local community newspaper.

5.2.4 Stormwater Utility Rate Structure

For an overview of Reading’s rate structure, see Table 6. The stormwater utility rate structure methodology was motivated by the desire to have a legally defensible system in the face of threats of public lawsuits. The goal of a defensible system meant both a simple, equitable method and a fee based on impervious surfaces. The decision to use impervious surfaces as a rate setting mechanism was based on the fact that it had been proven to be legally defensible by other towns pursuing a stormwater utility.

Table 6. Reading Stormwater Financing Mechanism Rate Structure and Budget

Property Characteristics		Equivalent Residential Unit (ERU)	Rates		Exemptions or Discounts	Credits	FY07 Storm-water Program Revenue	FY07 Stormwater Budget Expenses
Residential	Non-Residential		Residential	Non-Residential				
Ave. IA = 2,552 ft^2	Ave. IA = 16,526 ft^2	1 ERU = 2,552 ft^2	Single and two-family = $9.96/qtr or $39.84/yr	Multi-family, commercial, industrial rate of $39.84/ 2,552 ft^2	Exemption - undeveloped property Discount - Early payment (10%)	Stormwater BMPs with max. credit of 50%	$357,000 (Enterprise Fund only)	New laborers, stream and drainage maintenance, drainage system mapping, IDDE

Additionally, it was clear to the decision makers that the stormwater pollution potential is related to the amount of impervious surface and associated runoff volume.

The general rate structure is a refined fee structure. Therefore, there are different fees for single and two-family houses compared to multi-family, commercial and industrial properties. There is one flat fee for single- and two-family homes. The rationale for a flat fee was based on the evaluation of impervious areas of representative samples, which included several hundred single-family homes and two-family homes. This evaluation showed that the range of impervious areas was limited and the average of impervious surface was similar between the two types of housing units. Because of the low cost of the program, it was not cost effective to spend the time evaluating the impervious area for each property individually in GIS. Additionally, it was believed that each residential property receives roughly the same benefit from the utility and has an equivalent pollution potential.

For multi-family properties of three or more units, commercial properties and industrial properties, the utility is charged based on the total impervious area of the lot. The rationale for using impervious area for these properties was based on the wide range in lot size and impervious area among these properties. WSSMAC believed that a uniform unit rate, based on total impervious area was the most equitable. However, the total cost for multi-family housing cannot exceed the cost of a single family house on a per unit basis.

The rate structure methodology and billing was heavily based on information provided by GIS, which proved to be a necessary and invaluable tool for setting the utility rates. After the approval of the stormwater enterprise fund, the town transformed the town GIS coordinator position from half-time to full time. The GIS needs for the stormwater utility were one of the main drivers, although not the only causes, for creating a full time position for the GIS coordinator. Initially, the town investigated the property characteristics of several hundred lots from neighborhoods representative of different decades. This would provide an understanding of the general amount of impervious area per development without having to investigate every property. However, in the end, every property was evaluated.

GIS was used to develop the rate, calculate impervious areas, calculate the fees, apply the fees, and join assessing data, such as land use code, owner information. To calculate the fees, DPW staff used GIS to integrate three different data sources: ortho-photos, parcel boundaries and land use codes. In 1998, the Town of Reading commissioned aerial photography for the town with six inch resolution. This high resolution aerial photography was used as the basis for GIS layers used for determination of impervious area. These layers, or planimetric features, include building footprints, driveways, parking areas, and private roads. The GIS coordinator and building department assessed building permits from 1998 for any changes to impervious surfaces since the 1998 aerial photography. The permits were used to update the GIS system to represent current conditions. Parcel boundaries were used to divide the impervious surfaces into the appropriate lot and owner. The land use codes were imported from the town's assessing

database to determine the property type for each parcel. In addition, GIS was used to verify the data for anomalies such as small impervious areas or illogical land use codes. This verification reduced the number of incorrect bills, and therefore, complaints. Reading plans to update the impervious area of parcels based on new aerial photography, which is slated to be flown in 2008.

The average residential impervious area, 2,552 ft^2, was considered the 'stormwater unit' or one ERU. The multi-family, commercial and industrial rates were set by a comparison to the stormwater unit. The impervious area for multi-family residential and non-residential units was divided by 2,552 ft^2 to calculate the number of stormwater units. The FY07 enterprise fund stormwater budget of $375,000 was divided by the total number of stormwater units (both residential and non-residential) to determine the annual fee per stormwater unit of $39.84, which is applied to all single- and two-family properties. Multi-family, commercial and industrial properties were charged for the number of stormwater units of each property. For example, if an industrial property had 25,000 ft^2 of impervious surface, it would have 9.80 storm water units (25,000ft^2/2,552 ft^2). This property would therefore be charged the fee per stormwater unit multiplied by the number of units, which in this case is 9.8.

Exemptions, Discounts, and Abatements

Undeveloped properties without impervious surfaces are not assessed stormwater utility fees. While there are no exemptions for developed land, there are discounts and abatements on the stormwater utility. A property owner will receive a 10% discount if they pay the utility bill early. If a new development meets the DEP stormwater policy, they can receive abatement up to 50% of the stormwater utility fee. Additionally, any existing residential property that installs infiltration systems or other means to reduce the runoff is eligible for an abatement of up to 50% of the total assessment. Multi-family and non-residential properties need to install and maintain state-of-the-art stormwater treatment and infiltration systems to be eligible for up to 50% abatement of their total assessment. Typical stormwater devices that qualify for an abatement are drywells, infiltration chambers and detention ponds, while rain barrels and sump pumps do not quality. Property owners must complete an abatement application form, which is reviewed by the Engineering Division. These application forms are included in Appendix G.

5.2.5 Stormwater Utility Billing and Administration

The stormwater enterprise fund is administered within the DPW. The stormwater utility rate for single and two-family homes is $9.96 per quarter or $39.84 per year. Multi-family, commercial or industrial properties are charged $39.84 per year per stormwater unit, which is 2,552 square feet. The first bills, which included a Stormwater Enterprise Fund FAQ insert, were sent out in September 2006.

The stormwater utility is administered through the water and sewer bills, which caused some initial problems in the first few billing cycles. Complications arose for parcels that

had never previously received a water bill, such as parking lots. For these properties, a new stormwater bill had to be created. These owners that were suddenly receiving a new bill had many questions. Additionally, in the first few billing cycles, several owners received separate utility bills for adjoining parcels, which created confusion. This problem was corrected by joining these parcels together in GIS and adjusting the bills. DPW staff is prepared to return to the GIS data and recalculate fees as property owners complain, but this has only occurred in two instances. Other problems have occurred when the stormwater data was merged into the water and sewer database. However, these issues have been resolved by the close working relationship of the DPW and GIS departments.

Prior to sending out the first stormwater bills, Reading organized an information session for all staff related to the stormwater management program because town officials were already fielding questions from the public. Staff from DPW administration, collector's office, engineering division, and town clerk's office attended. Partially based on initial public concerns, this meeting explained the utility and who was responsible for which administrative aspects. Therefore, the staff was prepared to handle any possible public comments and questions. After the first billing cycle, Reading organized a second meeting with the same staff to discuss the successes and failures of the utility implementation. The results of this discussion are being used to continually strengthen the program.

5.2.6 Stormwater Utility Revenue and Expenses

The FY07 enterprise fund budget, which pays for only a portion of Reading's stormwater management program, is $375,000. This new source of funding for stormwater work allows the town to address a backlog of stream and drainage maintenance issues that have not been dealt with because of staff and funding shortfalls. After three to five years of the stormwater utility, the town may consider whether full funding for the stormwater management program come from the enterprise fund.

The enterprise fund supports stormwater management personnel divided between many divisions. There are a total of 3 full-time equivalents and one half time equivalent for laborers and mechanics, of which two are new positions, to conduct street sweeping, catch basin cleaning, ditch maintenance and vehicle maintenance. It is also estimated that the town engineer, DPW director, DPW business supervisor, and the health administrator each spend 10% of their staff time on stormwater-related work. Additionally 25% of the finance/accounting clerk's time is spent on the utility billing. The enterprise fund expenses include contract sweeping, vacuum truck rental, vehicle parts, materials and supplies, consulting fees and fuel. The ten-year capital plan for FY06- FY15 includes general drainage, drainage system mapping, illicit discharge detection, Saugus River restoration design and implementation, Aberjona River restoration design and implementation, dump truck, street sweeper, and vacuum truck. The FY07 Reading stormwater enterprise fund budget is included in Appendix F.

The operational costs and projects for FY07 are rebuilding catch basins, ditch cleaning and detention basin maintenance. Street sweeping is done weekly in downtown Reading and then yearly throughout the city. Catch basin cleaning is also done at least once a year. For the first five years of the stormwater utility, Reading is only committing to continue the stormwater activities at the old pace. After five years, the timing of these activities will be assessed in terms of funding.

With the adoption of the stormwater utility, there is more money available for pollution prevention work. Ditch cleaning and detention basin maintenance, which previously only occurred in response to a complaint of flooding, is now a regular operation of the DPW. In the first few months of the utility, Reading built 40 catch basins and replaced a major culvert in town, which had been in disrepair. For new town capitol projects, stormwater BMPs, such as stormwater interceptors, which trap and store oil and grease, trash, and suspended sediments from the first-flush of a rain storm, are being installed. With funding from the utility, DPW staff can now properly maintain these BMPs and ensure that they function properly.

5.2.7 Stormwater Utility Implementation

In general, the public response to the Reading stormwater utility was mostly questions, with only a few complaints. This may be a result of the exhaustive efforts by Reading to develop a defensible and equitable rate structure based on impervious area using GIS, which also helped to validate and justify the bills. GIS calculates the bill for each multi-family, commercial or industrial property individually. To further ensure the equity and legality of the utility, the stormwater utility was also reviewed by the town counsel and the MA Department of Revenue before the final presentation at the Town Meeting in April 2006.

Despite these efforts, two individuals filed a lawsuit against the town for initiating the utility. These individuals believe that stormwater-related work should be paid through local taxes and not by fees, which would allow them to deduct a portion of the tax from their income if they itemize their taxes. This suit is still underway, although one individual has dropped out of the suit for personal reasons. Reading's legal team believes the suit has little merit and is confident their utility will survive the legal challenge.

In addition to the individual lawsuits, there were initial complaints from certain tax-exempt entities including religious institutions, non-profits, and schools, who sought an exemption. However, the Board of Selectmen decided against any exemptions for these property owners. The DPW stormwater staff argued that the stormwater utility was similar to other utilities, which these properties are not exempt from paying. Eventually, the schools accepted the utilities even though they have the highest charges in town. However, these properties will be granted leniency for the first fiscal year of implementation since they may not have budgeted for this expense, since both municipal budgets and the stormwater utility were approved in April 2006.

5.2.8 Challenges, Lessons Learned, and Unique Features

There were several lessons that the Town of Reading learned during the development and implementation of their stormwater utility. GIS was very important in the development of the rate structure, calculating the bills, and creating a justifiable methodology. Educating the public before the implementation of the utility was invaluable in assuring public acceptance and minimizing complaints. Also, it was imperative to educate staff and prepare them to answer public questions after the implementation. Another important consideration before implementation was the abatement process, including the abatement amount, abatements qualifications, and which personnel or departments will review and approve the abatements. From the individual lawsuits, Reading learned that it was important to choose the billing method carefully. It was imperative to be able to justify the methodology and understand other possible financing options and the pros and cons associated with them, such as taxes vs. fees.

Another issue that arose was that municipal departments were not prepared to pay for the stormwater utility. Reading recommends determining ahead of time which departments will pay into the utility on. For example, in Reading, the School department owns the buildings while the Public Works Department owns the grounds. It was not determined before utility implementation how the cost of the utility would be split between these two departments. In addition, it is important to target education and outreach efforts to municipal officials, school boards, and church members before implementation.

Reading encountered problems in attaching the stormwater utility to the water bill. There was public confusion for homeowners who suddenly received a new bill and those who received multiple bills. These problems were rectified through rigorous analysis using GIS and educating municipal staff so they can address public concerns.

Factors that Reading recommends other municipalities consider during the development and implementation of a stormwater utility are time, delays, local opposition, and development costs (Delaney, Honetschlager, and McIntire, 2006). These are outlined in a draft NEWWA paper, which DPW staff wrote after the adoption of the utility. The municipality should anticipate that the utility implementation will require research and a potentially long political process. Additionally, delays may occur along the way which will slow down the process. The stormwater utility planning should include the possibility of delays. Additionally, having time to fully consider the utility and possible complications will ensure a stronger utility overall. It is important for a municipality to expect and understand the local opposition, especially to determine if the opposition represents a few opinions or a community consensus. The final consideration is the cost of utility development, which can be done in-house or through a consultant. If the utility is developed in-house, it is important to account for staff time and expenses in the development. On the other hand, consultant costs could be substantial. This paper is included in Appendix H.

A unique feature of Reading's process, which aided the acceptance of the stormwater utility, was an elected Town Meeting government. Since many of these officials served in an elected capacity for over ten years, they were familiar with stormwater activities,

budget requests, capital costs and the competition of stormwater with other services for general funding. This understanding of the state of stormwater funding increased the acceptance of the stormwater utility.

5.3 South Burlington, Vermont

5.3.1 Community Profile

The City of South Burlington is located in Northwestern Vermont (Figure 1). South Burlington has a population of 15,814 in 16.6 square feet of land, which leads to the high percentage of open space (60%). Only 40% of South Burlington is developed land (Figure 6). Compared to Newton and Reading, which are fairly built out, there is more land available for stormwater treatment and a higher potential rate of development. The developed areas of the town include 93 miles of roads and 50 miles of sidewalks and paths. Table 7 highlights the community description.

Table 7. South Burlington Stormwater Financing Mechanism: Community Profile

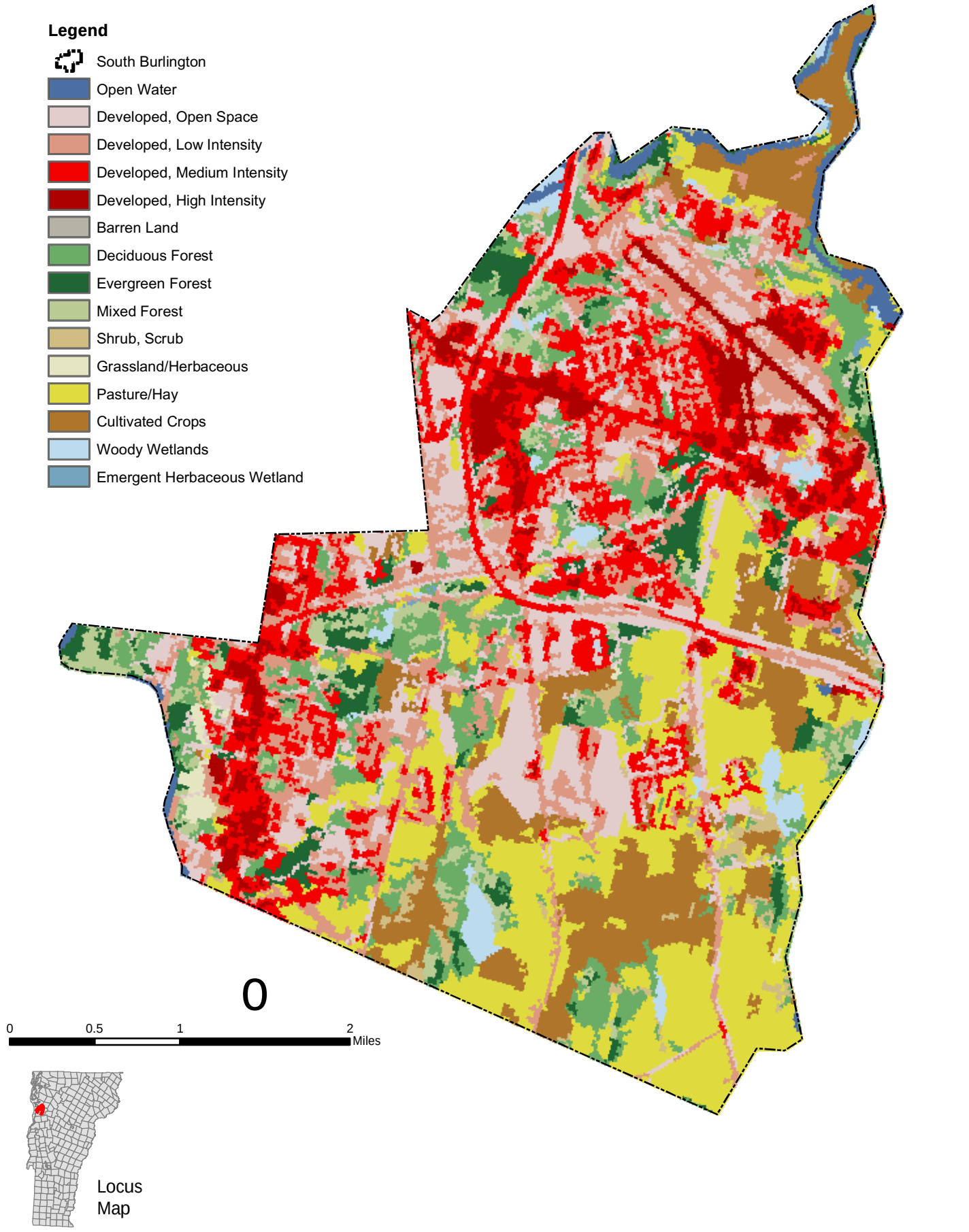
Population[1]	Land Area (sq. mi)	Watersheds	Stormwater-Related Issues	Primary Land Use	Impervious Area
15,814	16.6	Lake Champlain; Six Brooks – Bartlett, Centennial, Englesby, Muddy, Munroe, and Potash	Poor water quality, flooding, erosion and sedimentation	High and medium density developed land, pasture and hay	

[1] Based on US Census, 2000

South Burlington's open space includes a high percentage of water resources, over 13 ft^2 (Figure 7). The City of South Burlington drains to ten different waterways, including Bartlett Brook, Centennial Brook, Potash Brook, Winooski River, Lake Champlain, North Brook, and Shelburne Pond. In addition, Bartlett, Munroe, North and Potash Brooks drain directly into the Shelburne Bay section of Lake Champlain.

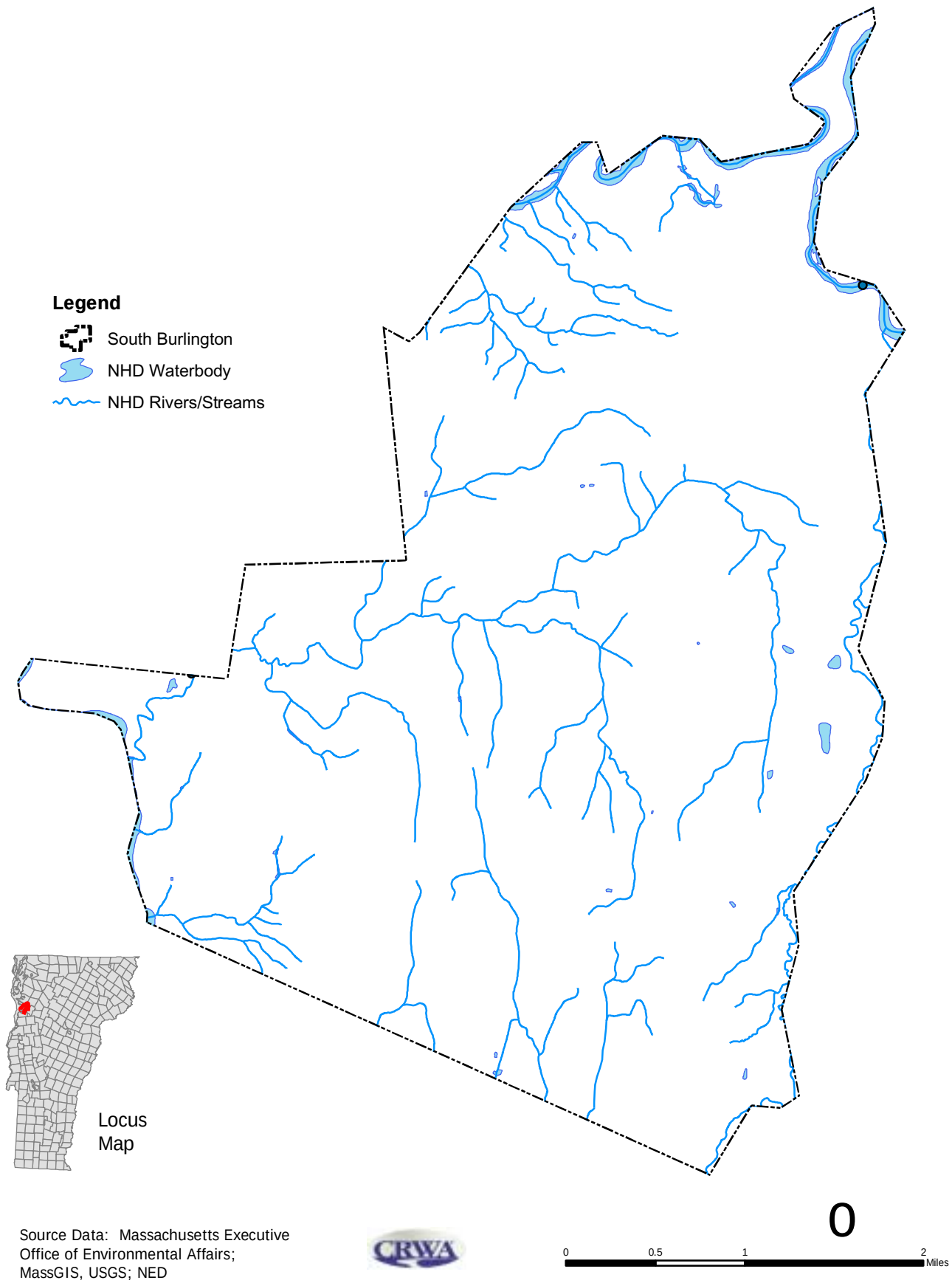
South Burlington has an extensive stormwater infrastructure, which includes 50 miles of pipes and drains. In addition to pipes and drains, the stormwater infrastructure includes catch basins, culverts, and stormwater outfalls. There are approximately 3,700 – 4,000 catch basins within South Burlington, of which approximately 75% are on city property.

Figure 6. South Burlington Land Use Map



Source Data: Massachusetts Executive Office of Environmental Affairs; MassGIS, MRLC Consortium; NLCD, 2001

Figure 7. South Burlington Hydrography Map



Source Data: Massachusetts Executive Office of Environmental Affairs; MassGIS, USGS; NED

Six waterways in South Burlington are on the State's list of impacted waterways due to stormwater runoff pollution. These are Bartlett, Centennial, Englesby, Muddy, Monroe and Potash Brooks. This water quality pollution, in addition to localized flooding, was among the motivating factors for South Burlington to investigate a stormwater utility. Other motivating factors included severe erosion, sedimentation and unstable stream banks in the City's waterways. Additionally, the stormwater system, both public and private, was in great need of repair.

5.3.2 Stormwater Management Budget Prior to Stormwater Utility and Proposed Utility Budget

During the development of the stormwater utility, South Burlington performed an assessment of the current stormwater program budget, which was $140,000. This budget included labor and equipment expenses for stormwater activities conducted by DPW, Water Pollution Planning Control, Parks and Recreation, and the City Manager's office. This included street sweeping, catch basin cleaning, and repairing and cleaning drainage ditches. However, not all the stormwater infrastructure was being maintained or upgraded as needed because of lack of resources.

After an assessment of the current budget, South Burlington assessed the needs and wants of these different departments for stormwater activities. This needs assessment became the basis for the proposed stormwater budget funded by a utility, which was projected to range from $1.1 to $1.4 million a year. The utility budget includes $358,718 for personnel, $414,000 for operating expenses, and $376,000 for capital expenses. The stormwater utility will fund the salary and benefits of all personnel on stormwater-related projects. This includes four dedicated stormwater laborers and engineers from the DPW, city planner, and legal staff. In FY06, the city planner spent 20% of her time on stormwater activities and for FY07 it is budgeted at 10%. Operating expenses include equipment, vehicle maintenance, legal services, consulting fees, and office supplies. Capital expenses include water quality monitoring, stormwater infrastructure maintenance and upgrades, such as drains, catch basins, culverts, and retention ponds, GIS, and capital improvement projects. Also included in the budget of the stormwater utility is the management, maintenance, and permitting of residential stormwater systems that the city will acquire (if desired by the property owner). Any system taken on by the utility must be brought up to state standards prior to acquisition. The utility also supports expansion of stormwater systems within South Burlington.

5.3.3 Stormwater Utility Development - Consultants, Political Process and Public Education

Table 8 shows an overview of the South Burlington utility development considerations. The majority of the stormwater utility development work was split between DPW staff, the Planning Department, a stakeholder's advisory committee and an engineering consulting firm. South Burlington hired the consulting firms, Hoyle, Tanner and Associates, Inc. and AMEC Earth and Environmental, Inc., to assist the city in the development of the stormwater utility and its implementation including customer service

Table 8. South Burlington Stormwater Financing Mechanism Development Considerations

Fee Enacted/ Bills Sent Out	Develop-ment Period	Public Education	Approval Process	Start-Up Strategy	Fee Structure	Multi-Family Approach	Fee Basis and Data Collection	Organizational Structure	Fee Collection
March 2005/ July 2005	Four years	Public presentations; stormwater brochures; stormwater website; breakfast meetings with largest utility rate payers; stormwater flyer; usage of regional stormwater materials	Stakeholders group of city employees and private residents; City Council	Refined fee structure	Flat rate for residential; tiered rate for others	Treat complex greater than triplex as a non-residential property	Actual amount of impervious area	Within Stormwater Division of DPW	Use water bills

after the first bills. In 2001, the consultants conducted a feasibility study, which included an investigation of comparable stormwater utilities nationwide, an assessment of South Burlington's current stormwater activities, and the creation of a complete stormwater budget that incorporates all stormwater-related expenses of the various municipal departments.

The stakeholders group, called the Stormwater Advisory Committee (SWAC), brainstormed utility implementation and rate structures. This group was composed of DPW staff, the planning director, the city manager, the finance director, a development review board member, large real estate owners, and general residents. They were charged with the responsibility of reviewing the minimum baseline stormwater budget of $140,000 and determining what activities, equipment and staffing that the stormwater management program could include if funding were not a limit. Specifically, they investigated the City's stormwater priorities and desired stormwater services. After the wish list was defined, they estimated the total cost of the desired stormwater program, suggested possible funding sources, and determined how much the average citizen would be willing to pay for stormwater services. The consensus among the stakeholders was that citizens would be willing to pay between $4 and $5 per month.

Next, the consultants worked with municipal staff to develop a dedicated, stable funding source for stormwater through a utility. AMEC proposed using impervious surfaces as the basis for the rate structure, since this mechanism was legally defensible and had been tested nationally. However, AMEC advised South Burlington that calculation of impervious areas of properties throughout the city would require hand-digitizing, which would have required a significant amount of time and money.

Therefore, South Burlington assembled a technical advisory committee, comprised of representatives from the University of Vermont (UVM) Spatial Analysis Laboratory and the Vermont Regional Planning Commission (RPC), to estimate impervious areas using satellite imagery from QuickBird®, a high-resolution commercial earth observation satellite, an algorithm and GIS. The rate setting methodology including estimation of impervious areas is described further below.

The proposed stormwater utility was presented twice to the city council. These presentations included an overview of stormwater, its impacts, and problem areas and the stormwater utility structure and its benefits including, possible projects to be funded. In March 2005, the city council approved and amended the sewer and stormwater ordinance to establish stormwater system user fees. A copy of the South Burlington ordinance is included in Appendix I.

Public Education

South Burlington conducted a small amount of general public education during the utility development phase, including several public presentations that were similar to those delivered to the City Council, but included more in-depth descriptions of problem areas, benefits, differences between a tax and a utility, and information on how the rate is

structured. South Burlington also created two brochures. They relied primarily on other stormwater educational materials from the Phase II Stormwater Program, regional stormwater education materials, and stormwater publicity of other organizations to raise the public's awareness of local stormwater issues. The majority of the public education, both general and targeted, was conducted just prior to the disbursement of the first utility bills. These efforts are described further below, with examples included in Appendix D.

5.3.4 Stormwater Utility Rate Structure

Table 9 provides an overview of South Burlington's rate structure and budget. South Burlington retained the expertise of the University of Vermont Spatial Analysis Laboratory and the Vermont Regional Planning Commission (RPC) to estimate impervious areas using satellite imagery from QuickBird®, a high-resolution commercial earth observation satellite, an algorithm and GIS. In 2002, there was a declassification of infrared mapping from the satellites with one-meter resolution. A UVM professor developed an algorithm to determine impervious area from the satellite imagery. The RPC then conducted a very detailed quality control study to estimate the average impervious area for typical single-family residence in South Burlington. Since the one-meter resolution satellite images led to a high margin of error, RPC selected a statistically significant representative sample of single-family homes for a quality assurance study. They field checked the impervious areas of the sample parcels with the estimates derived from the algorithm and satellite imagery to ground truth that this tool could be used to estimate impervious areas. This study provided information on the error and uncertainty of using the UVM algorithm and satellite imagery to calculate impervious area. RPC also calculated the average and median impervious areas for different size parcels and percent impervious area to select an appropriate statistic for the rate setting mechanism. To continually update the stormwater utility data on imperviousness, the city plans to obtain new satellite imagery on a bi-yearly basis using QuickBird®. Since the town experiences a high pace of development, South Burlington will use the bi-yearly QuickBird® imagery to incorporate new impervious areas into the database. The algorithm allows the utility to continually update the GIS-based billing system with new satellite imagery. The first update will be completed in June 2007.

South Burlington decided to structure the utility rates based on impervious area differently for residential and non-residential property owners. There is a simple, flat fee for single-family homes, which is based on 2,700 ft^2, the average impervious area of a typical single-family South Burlington home. One equivalent residential unit (ERU) is equal to 2,700 ft^2 of impervious area and is charged $4.50 per month. Two- and three-family homes also are charged a simple, flat fee, which is typically divided equally among units. In contrast, multi-family, commercial and industrial properties are charged based on the actual amount of impervious area. These properties, categorized as non-single family residences (NSFR), fall under one of ten tier categories based on the percent imperviousness and then are assigned a 'tier factor,' essentially a multiplier to calculate the number of ERUs for a property. To determine the utility rate, the algorithm is run on the satellite images, which yields impervious area. GIS is then utilized to divide the impervious area into numbers of ERUs and determine the correct tier for the property.

Table 9. South Burlington Stormwater Utility Rate Structure and Budgets

Property Characteristics		Equivalent Residential Unit (ERU)	Rates		Exemptions or Discounts	Credits	FY07 Storm-water Program Revenue	FY07 Stormwater Budget Expenses
Residential	Non-Residential		Residential	Non-Residential				
Ave. IA = 2,700 ft^2	NA	1 ERU = 2,700 ft^2	Single-family = $13.50/qtr or $54/yr; Two-family = $6.75/qtr or $27/yr; Three-family = $4.50/qtr or $18/yr	Multi-family, commercial, industrial fee based on amount of impervious area using a ten-tiered rate system.	Exemption – Limits of railroad track right-of-way	No residential credits; Non-residential credits - Stormwater Treatment Practices w/ max. credit of 50%; MS4 credit w/max. credit of 10%; education credit w/max. credit of 10%	$1.1 million	Capital projects, maintenance and operations, engineering and planning, regulation and enforcement, water quality programs, special services, administration and management, coverage requirements, reserve funds, and misc. overhead

GIS was also used to join the satellite images with the geo-referenced tax maps and assessing data. Combined, these data sources yielded a large database, which includes parcel ID numbers, owner information, street addresses, number of ERUs of NSFR properties, the utility fee, and notes on the account. NSFRs are charged approximately $4.50/ERU/month, which is slightly modified based on the tier. GIS staff investigated any properties that might be incorrect, such as properties near a tier level. For these properties, GIS staff hand-digitized the impervious area and conducted site visits as field checks. Additionally, there were some issues with the amount of impervious area percentages being rounded up and owners being overcharged. GIS staff recalculated the correct amount of impervious area and re-assessed the utility fee.

The disadvantage to this tiered system is that it is based solely on amount of impervious surfaces. To receive a significant decrease in the utility bill, property owners must remove impervious area, not just install stormwater BMPs. Even rerouting stormwater runoff will not yield a significant decrease in the utility charge. However, basing the utility on the amount of impervious surfaces maintains a stable utility structure and revenue source.

Credits and Exemptions

South Burlington offers several types of stormwater utility credits to reduce the impact of stormwater runoff, however, only NSFR properties are eligible. Stormwater utility credit policies and procedures are outlined in detail in the city's manual (Appendix G). Properties that employ stormwater treatment practices are eligible for an on-going credit of up to 50% of their utility bill. Stormwater treatment is assessed for the following general criteria, with the corresponding maximum credit percentage: water quality (15%), groundwater recharge (15%), channel protection (15%), overbank flood/extreme storm (10%), or non-structural practices (10%). Non-structural stormwater treatment may be utilized in combination, but may not yield a credit greater than 10%. These include: natural area conservation, disconnection of roof runoff, disconnection of non-roof runoff, stream buffers, grass channels, and environmentally sensitive rural development. Stormwater treatment systems must be designed, constructed and maintained according to the *Vermont Stormwater Management Manual* (2002). Permitted MS4s that install BMPs can receive credit up to 10% of their utility bill. Additionally, NSFR properties that are federally required to install and maintain BMPs are also eligible for MS4 credit. Any public or private school that participates in stormwater education may receive credit for up to 10% of their stormwater utility. To receive credit, eligible property owners must complete credit applications (Appendix G). The stormwater staff reviews the applications and grants the credits.

The credit system was established in February 2006, but was not in place at the time of the utility implementation. Stormwater staff decided to focus their energy on developing and implementing the utility instead of developing a credit system. After the utility was in place, stormwater staff felt that the credit system could be established when there would be revenue, visibility and public acceptance of the utility. Currently, eight

properties have filed for credits, and only one has been granted as of February 2007. The credit applications of the remaining properties are still under review.

Only one type of property is exempt from the stormwater utility; the railroad tracks right-of-way. There is a national precedent for exempting railways right-of-way. Additionally, the railroad companies threatened to sue if South Burlington charged them the utility. There are several large property owners that are offered credits or allowed to provide payments and/or in-kind goods or services in-lieu of the fee; 1) University of Vermont, 2) Burlington International Airport (BIA), and 3) the state transportation agency. The University of Vermont was given a 50% credit so their utility fee would be lower and more manageable. The BIA, which has 12.5 million square feet of impervious area, would have received the largest utility charge of $19,544 per month. Since the airport is the most valuable property owner in town, there was political pressure to compromise on the stormwater utility. DPW legal staff is in the process of negotiating an agreement for a partial fee, which incorporates the airport's efforts to offset their stormwater impacts. Although the Vermont enabling laws subject state agencies to the utility charge, the transportation agency threatened to sue the City of South Burlington if they leveraged the utility. For over three years, stormwater and legal staff have been in negotiation with the transportation agency over an agreement wherein the agency would provide services in lieu of payment of their stormwater utility of approximately $45,000 a year. Although the Memorandum of Understanding is still being negotiated, DPW and stormwater staff can use the agency's equipment without pay at any time.

Instead of a credit system for residential properties, the City of South Burlington offers to take control of ownership and maintenance of residential stormwater systems as well as assume responsibility of the system's stormwater discharge permit that is required by State law. However, before South Burlington will take control, the residential homeowner must modify and upgrade their system to the 2002 Vermont 'Best Fix' Standards as feasible on the site. If the stormwater system is taken over by the city, whether in the form of title ownership or holding an easement, then the homeowner will pay 100% of the utility but will no longer have responsibility for maintaining, inspecting and repairing their system, such as drains, catch basins, culverts, and retention ponds. All costs including repairs, maintenance and capital upgrades of residential stormwater systems will be covered by the city's stormwater utility. This fact was a major selling point of the stormwater utility to many residents and helped ensure adoption by the City Council. As of February 2007, South Burlington has taken over one system, but twelve other systems are in the application process. More details about the city's residential takeover program can be found in FAQ brochure (Appendix D).

5.3.5 Stormwater Utility Billing and Administration

The stormwater management program is located within a newly created Stormwater Department of the DPW while the stormwater utility bills are administered on a quarterly basis by the Lake Champlain Water District. The first bills were sent out in July 2005. Single-family homes are charged $13.50 per quarter or $54 per year. Duplexes are charged $6.75 per quarter or $27 per year while triplexes are charged $4.50 per quarter or

$18 per year. NSFRs are billed according to a ten-tier scale and are charged approximately $4.50/ERU/month.

While administering the stormwater utility through the water district aided in implementation, there were some problems with billing staff from the water district not accepting additional responsibility for estimating the stormwater bills. To resolve this problem, stormwater staff conducted the majority of the billing work. This was accomplished through use of the GIS algorithm and database to determine the specific fee amount, which was sent to the water district. Some properties, such as systems with drinking water wells and on-site wastewater treatment, receive stormwater-only bills. For these properties, it was necessary to create a new bill.

For multi-family properties, South Burlington allows the property owner to decide how they want to be billed for their stormwater utility. Enclosed with the first stormwater bills, a form inquired how property owners wanted to be billed. GIS staff updated the database with these responses. However, it took three billing cycles to organize and finalize the correct billing. The entire bill for a multi-family property is either mailed directly to the condominium association or separate equally divided bills are sent to individual owners.

5.3.6 Stormwater Utility Revenue and Expenses

The anticipated revenue from the stormwater utility for FY07 is $1,100,000. This fund allowed for the salaries of four dedicated stormwater laborers, and for the time of other personnel involved in the stormwater management program, as described in Section 5.3.2.

Stormwater Improvement Projects

Funded with the stormwater utility revenue, South Burlington has completed upgrades and maintenance to the city's stormwater infrastructure including reconstruction and maintenance of detention basins and catch basins.

South Burlington is in the process of several large construction projects, which are funded jointly by the stormwater utility revenue and over $3 million from grants. Butler Farms/Oak Creek is a joint project involving University of Vermont, the City of South Burlington and the US EPA. These stakeholders are working with neighborhood residents to implement innovative stormwater BMPs on both their individual properties and the neighborhood common space. This project is focused on better stormwater management to reduce localized flooding and improve water quality.

Another project, the Williston Road/Air Guard Drive/Kennedy Drive**,** incorporates stormwater BMPs in the street redesign to improve water quality, decrease runoff volume, minimize localized flooding and restore the impaired watersheds. Examples of BMPs utilized in the street redesign project include detention ponds and bioretention facilities.

In addition to street redesign projects, the utility is also funding stream restoration projects, such as water quality improvements, stream daylighting and stream bank stabilization. The first of these projects was a large pilot project to restore Bartlett Brook using distributed, small land-use based stormwater treatment systems. Bartlett Brook was severely impaired by stormwater runoff, which was eroding the stream banks and degrading water quality with high levels of nutrients and bacteria. Additionally, uncontrolled stormwater runoff led to flooding in neighborhoods downstream of Bartlett Brook. Designed in conjunction with Vermont Agency of Natural Resources and Lamoureux and Dickinson Consulting Engineers, Inc., the stormwater treatment system involved converting a plot of commercial land into a sediment detention, constructed wetland and natural stream channel system. This system naturally traps sediment, removes pollutants, alleviates flooding, adds natural habitats and treats stormwater runoff. Results of water quality monitoring of Bartlett Brook before and after construction show the reconstruction project has resulted in the removal of petroleum hydrocarbons, bacteria, sediment and phosphorous. A similar restoration project is being developed for Potash Brook.

Increased Illicit Discharge Detection and Elimination

Another major stormwater management program task funded by the utility revenue is illicit discharge detection and elimination, a minimum control requirement of Phase II Stormwater Regulations. The city's Stormwater Division now has the staff, equipment and other resources to investigate possible illicit discharges or connections to the storm drain system in a timely fashion and remove them immediately to minimize their impact on local waterways. An ancillary outcome of this investigation work on city streets and private properties is the public education and outreach that stormwater staff can conduct. This impromptu education has intangible, but widespread benefits in improving general awareness of stormwater issues, its environmental, social and financial impacts, and behaviors and actions that improve the health of local waterways.

5.3.7 Stormwater Utility Implementation

In general, there were few public complaints to the implementation of the stormwater utility. The positive public acceptance is most likely due to two factors: 1) the relatively low amount of the yearly fee, especially for homeowners; and 2) the public education efforts undertaken just prior to the disbursement of the first stormwater utility bills in 2005. The city's new stormwater website, www.sburl.com/stormwater, includes information on local stormwater issues and the utility describing its function and benefits, billing rates, available credits, and contact people. Also posted on the site are FAQs about the residential stormwater system takeover program, the amended ordinance establishing the utility, credit applications, and a flyer about the utility (Appendix D). This flyer was included as an insert in the first stormwater utility bills. The stormwater staff also gave several presentations about stormwater and the utility (Appendix D).

In addition to the wider, general public education and outreach, South Burlington targeted efforts to property owners with the highest utility rates who were more likely to oppose the new fee. After the rates for each property were determined, the South Burlington Planning Department compiled a list of all the property owners with bills over $100/month, either on a single property or combined property holdings. These owners were sent a letter about the utility and an invitation to one of several breakfast meetings with the stormwater staff (Appendix D). At these meetings, the stormwater staff explained the stormwater problems, federal and state regulatory requirements, and the utility concept. The owners were receptive to the meetings and the stormwater utility. With very little monetary investment, the staff avoided receiving complaints or opposition from property owners with the highest utility bills.

There were some initial issues in setting up and assigning responsibilities for the billing process. The Lake Champlain Water District was somewhat weary of accepting the responsibility of creating and sending out the stormwater bills. The stormwater staff addressed this by building a comprehensive GIS database which clearly identified the stormwater utility for each bill. Additionally, the planning department phone number was included in the water bills so that all public complaints and questions would be received by stormwater staff and not the water district.

GIS staff remained involved in the utility implementation investigating the billing complaints, which included impervious area data reassessment and combining bills for individual parcels with the same owner into one bill. For these owners, GIS staff combined the parcels in GIS and reran the algorithm, which yielded one bill.

5.3.8 Challenges, Lessons Learned, and Unique Features

Through this process, South Burlington learned that it was not necessary to have their engineering consulting firms conduct all of the work involved in the development and implementation of the utility, especially the GIS-related billing work and customer service. The city felt that some of the work could have been conducted in-house with temporary employees, including those with GIS expertise, which may have saved both time and money on the entire process.

South Burlington acknowledges that there is a disadvantage to a tiered rate system that is based on impervious area. To receive a significant decrease in the utility bill, property owners must remove a significant amount of impervious area to drop down a tier category and lower their property's ERUs. Implementing stormwater BMPs that rerouted stormwater runoff will not yield a significant decrease in the utility charge. However, basing the utility on the amount of impervious surfaces maintains a stable utility structure and revenue source.

There is a unique feature to South Burlington's stormwater management program and utility. The State requires stormwater discharge permits for all properties with two or more acres of impervious area, which are tied into the property title and have a five-year lifespan. However, in the 1980s and 1990's, many permits expired without notice to the

property owners because the Vermont Department of Natural Resources lacked staff for timely renewal of permits and failed to inform new owners of their stormwater permitting obligations. In addition, without a current permit, homeowners are not allowed to sell their homes and they are experiencing delays and difficulties in meeting their permit requirements. This requirement and the large number of expired stormwater discharge permits motivated the city to seek a dedicated, fee-for-service funding mechanism for stormwater management and was a significant factor in the approval and acceptance of the stormwater utility by decision-makers and the general public.

An additional factor in South Burlington was a permit appeal brought by Conservation Law Foundation against the issuance of a state stormwater permit for a Lowe's Home Center. The appeal was based on the fact that the receiving water, Potash Brook, would not be protected from degradation under the proposed project design. This appeal resulted in a significant delay in the construction of the Lowe's Home Center and generated tremendous press. While the suit was eventually settled, and resulted in a significant improvement of the Lowe's stormwater management design, the publicity brought by this appeal built significant public and private sector awareness about the need for better stormwater management.

The city is now alleviating the stormwater discharge permit crisis with their residential stormwater system takeovers program that is being funded by the utility. Once a residential stormwater system meets the city's 2002 'best fix' standards, the city will not only takeover the maintenance and repairs for the system but also will handle permitting including renewal and removal from the title of the property. While it is an enormous undertaking to take over stormwater treatment systems and renew stormwater discharge permits, the city's management of these systems will ensure that they are operated and maintained properly and provide adequate control and treatment of stormwater runoff.

6.0 SUMMARY AND COMPARISON OF FINDINGS

CRWA researched three New England municipalities that have adopted stormwater utilities since 2005: South Burlington, Vermont, Reading, Massachusetts, and Newton, Massachusetts. These three programs, each with their own somewhat different structure, scope, and development process, are important models for other municipalities in New England interested in pursuing the adoption of a utility.

Although these three municipalities differ in their community structure and size, the motivation for pursuing a stormwater utility was similar for all three municipalities (Table 10). For all the municipalities, improving water quality, reducing flooding, and addressing NPDES Phase II program requirements were the main factors to pursue dedicated stormwater funding. The town rate of growth impacts the stormwater utility development. Among the three towns, South Burlington has the largest amount of open space and Newton the least. Although Reading has large forested areas, both Newton and Reading are fairly built-out. In contrast, South Burlington is still experiencing a fast rate of development. Newton and Reading were also frustrated with the lack of funds to

address stormwater management, stormwater infrastructure, and stream restoration. Newton faced federal pressure to address illicit discharges. South Burlington needed to address expired stormwater discharge permits.

6.1 Stormwater Utility Development and Implementation

Although motivations were similar, the stormwater utility development process differed between the three municipalities. For example, Reading and Newton combined the stormwater utility with the existing water and sewer utilities, while South Burlington created a stormwater department within DPW. Table 11 shows the development considerations for all three municipalities throughout the stormwater financing mechanism. The development of the rate structures, actual utility rates, and stormwater budgets differ greatly for each municipality. Table 12 provides a comparison between the rates and FY07 stormwater budgets.

There are several commonalities, for example, all three municipalities organized their stormwater utility within the DPW. All municipalities hired dedicated laborers to work on stormwater infrastructure maintenance, upgrades, and improvement construction projects. An individual summary of each municipality's stormwater utility development follows below.

6.1.1 Newton, Massachusetts

A unique factor of the City of Newton's stormwater utility development was that it was done completely in-house, within five months. The Newton DPW recognized the need for dedicated staff to address stormwater management and the Phase II requirements. Therefore, dedicated stormwater funding was necessary to support the new staff and program. For the City of Newton to adopt the stormwater utility, this proposal needed approval by the Stormwater/ Sewer Committee, then the Public Facilities Committee (PFC), a subcommittee of the Board of Aldermen, and finally the full Board of Aldermen. DPW staff presented the state of stormwater in Newton and the concept of the stormwater utility to the Stormwater/ Sewer Committee and the PFC. The presentation included a description of the city's current stormwater functions, stormwater and drainage needs, and the 2004 administrative order by EPA to detect and eliminate known illicit discharges. The Board of Alderman approved the stormwater utility and rates in April 2006.

The City of Newton developed a simplified fee structure based on the percent impervious area, with separate rates for residential and non-residential properties. In-house, Newton conducted a representative sample of both types of properties and investigated both the average and median for the following parameters: lot size, amount impervious area, and percent impervious area. Since there was a small range for the percent impervious surfaces within either property type, the City of Newton felt confident in charging a uniform rate for each type. The city used the median residential impervious area for a median residential lot size, 3,119 ft^2, as the base unit of measure or the Equivalent Residential Unit (ERU). Thus all single-family and two-family lots are assessed one

ERU. On the other hand, commercial and industrial properties are assessed six ERUs because the median impervious area of a commercial lot is approximately six times the impervious area of the median residential lot, 18,587 ft^2.

The utility is billed quarterly, with the first round of bills initiated in August 2006. The City of Newton tied the stormwater utility into the water bill and the water meters. Therefore, the number of bills a non-single family residential unit receives is based on the number of water meters and not the amount of impervious surfaces. All residential properties, per water meter, are charged $6.25 a quarter or $25 a year. Commercial and industrial properties are charged $37.50 a quarter or $150 a year. These rates are controlled by the board of alderman and will be reviewed annually.

The stormwater utility in FY07 generated $575,000 of revenue for stormwater management. This revenue funds all aspects of the Phase II requirements, including stormwater personnel salaries, stormwater pollution prevention maintenance, water quality sampling, public education materials, illicit discharge investigations, and new projects involving stormwater BMPs. Stormwater staff now includes one full time environmental engineer and four dedicated laborers.

The City of Newton is in the process of several new construction projects to reduce stormwater pollution. One project involves the construction of sand filters to treat the stormwater generated from a large parking lot. The City of Newton is also investigating the use of stormwater BMPs in pipes that drain municipal properties into surface waters.

6.1.2 Reading, Massachusetts

During the three years of the development of their stormwater utility, the Town of Reading collaborated with a diverse group of stakeholders. This group recommended dedicated stormwater funding to the Board of Selectmen. The Water, Sewer, and Stormwater Management Advisory Committee (WSSMAC) was charged with developing the stormwater budget and rate structure in collaboration with DPW staff. These findings were presented in a report to the Board of Selectmen, who voted to approve the utility. In the case of Reading, the length of the stormwater development was a hindrance; by the time the Board of Selectmen voted on the utility, there was no longer consensus support for the utility within the board. Therefore, the board compromised to fund stormwater through a hybrid of a stormwater utility enterprise fund and general taxes.

The Town of Reading hired new GIS staff to develop data and improve the Town of Reading's GIS capabilities in order to assess the utility rates in-house. In 1998, the Town of Reading obtained high-resolution aerial photography. From this aerial photography, GIS was used to assess the impervious area for each property. GIS was used to develop the methodology, calculate the fees, apply the fee to each property, and identify both the parcel land use and owner. In addition, GIS was used to verify the data for anomalies before the first billing cycle. This verification reduced the number of incorrect bills, and therefore, complaints.

The Town of Reading established a refined fee structure for their utility. The average residential impervious area, 2,552 ft^2, was considered the 'stormwater unit' or one ERU. The multi-family, commercial, and industrial rates were set by a comparison to the stormwater unit. The impervious area for multi-family residential and non-residential units was divided by 2,552 ft^2 to calculate the number of stormwater units. The stormwater utility rate for single and two-family homes is $9.96 a quarter or $39.84 a year. Multi-family, commercial or industrial properties are charged $39.84 a year per stormwater unit. The stormwater utility was added to the water and sewer bills and billed quarterly.

In Reading, the funding for stormwater is a hybrid from the stormwater enterprise fund and the general taxes. The total estimated cost of the program is $540,350. This estimated cost includes $202,750 for personnel costs. Capital costs for drainage related projects and equipment were estimated at $285,000 and program expenses were estimated at $52,600. The revenue from the enterprise fund for FY07 was $357,000. This fund allowed for the hiring of two new laborers, and for the time of other personnel involved in the stormwater management program, including laborers, mechanics, town engineer, DPW administrative staff, the health administrator, and the finance/ accounting clerk. Costs in the expense estimate include contract sweeping, vacuum truck rental, vehicle parts, materials and supplies, consulting fees and fuel. The ten year capital plan from FY06- FY15 includes general drainage construction and maintenance, drainage system mapping, illicit discharge detection, Saugus River restoration design and implementation, Aberjona River restoration design and implementation, and the purchasing of a new dump truck, street sweeper, and vacuum truck.

6.1.3 South Burlington, Vermont

South Burlington spent four years developing and implementing their stormwater utility. This process was guided by both outside consultants and a diverse stakeholders committee, the Stormwater Advisory Committee (SWAC). The consultants provided structure to the development process and knowledge about comparable, national utilities. The consultant also produced the initial assessment of the current stormwater budget and aided with developing a stable, funding source. SWAC was tasked with the responsibility of looking at the baseline budget, the City's stormwater priorities, and desired stormwater services. They estimated the total cost of the stormwater program, suggested funding sources, and determined how much the average citizen would be willing to pay for stormwater services.

The proposed stormwater utility was presented twice to the city council. These presentations included an overview of stormwater, its negative consequences, the utility structure, utility benefits, problem areas and proposed projects. In March 2005, the city council approved and amended the sewer and stormwater ordinance to establish stormwater user fees.

Concurrently, South Burlington assembled a technical advisory committee, which included the University of Vermont (UVM) Spatial Analysis Laboratory and the Vermont

Regional Planning Commission (RPC) members. A UVM professor developed an algorithm to determine the amount of impervious area per parcel from satellite imagery. The results of this algorithm were field checked by members of the RPC. The algorithm will allow South Burlington to address new development by updating the stormwater utility rates against bi-yearly ortho-photography.

South Burlington's stormwater utility is based on the amount of impervious area per parcel. There is a flat fee for single family homes, which is divided equally among residences in two and three family homes. This flat fee is based on the average impervious area for single-family residences. Multi-family, commercial and industrial properties, which are categorized as non-single family residences (NSFR), fall under one of ten tier categories based on the percent imperviousness. These properties are then assigned a 'tier factor,' which is essentially a multiplier to calculate the number of ERUs for a property. In summary, To determine the utility rate, a GIS algorithm determines impervious area, number of ERUs, and the correct tier for the property.

The stormwater utility rate is billed quarterly with the water bills. Single-family homes pay $13.50/quarter or $54/year, duplexes are charged $6.75/quarter or $27/year, and triple-family homes are charged $4.50/quarter or $18/year. NSFRs are charged approximately $4.50/ERU of 2,700 square feet of impervious area/month, which is slightly modified based on the tier of the property.

The FY07 stormwater budget was $1.1 million. The utility budget includes $358,718 for personnel, $414,000 for operating expenses, and $376,000 for capital expenses. The stormwater utility will fund four dedicated stormwater laborers and partial time for an engineer and legal staff. Operating expenses include equipment, vehicle maintenance, legal services, consulting fees, and office supplies. Capital expenses include water quality monitoring, stormwater infrastructure maintenance, GIS, and stormwater improvement projects. Additionally, once a residential system is taken over by the City of South Burlington, the capital costs will fund management, maintenance, and upgrades to all residential stormwater systems owned by South Burlington.

Using stormwater utility revenue, South Burlington has completed upgrades and maintenance to the city's stormwater infrastructure. These projects include reconstruction and maintenance of detention basins and catch basins. South Burlington is in the process of several large construction projects, which are funded jointed by the stormwater utility revenue and over $3 million from grants. One example is a neighborhood redevelopment project to implement a combination of innovative stormwater BMPs on both their individual properties and the neighborhood common space. Other projects include street redesigns that will construct stormwater BMPs to improve water quality and decrease runoff quantity, and stream restoration of highly eroded stream channels.

Table 10. Stormwater Financing Mechanisms: Community Profiles

	Population[1]	Land Area (sq. mi)	Watersheds	Stormwater-Related Issues	Primary Land Use	Impervious Area (sq. ft)
Newton, MA	83,829	18.1	Charles River; Four Brooks – Sawmill, Cheesecake, Laundry, and South Meadow	Poor water quality, flooding, illicit connections	High and medium density residential, industrial, commercial	277,529,472
Reading, MA	24,145	9.9	Aberjona, Ipswich and Saugus Rivers	Poor water quality, flooding, erosion and sedimentation	Forest, medium density residential, commercial	27,559,304
South Burlington, VT	15,814	16.6	Lake Champlain; Six Brooks – Bartlett, Centennial, Englesby, Muddy, Munroe, and Potash	Poor water quality, flooding, erosion and sedimentation	High and medium density developed land, pasture and hay	

[1] Based on US Census, 2000

Table 11. Stormwater Financing Mechanisms Development Considerations

City	Fee Enacted/ Bills Sent Out	Develop-ment Period	Public Education	Approval Process	Start-Up Strategy	Fee Structure	Multi-Family Approach	Fee Basis and Data Collection	Organizational Structure	Fee Collection
Newton, MA	May 2006/ August 2006	Five months	Local newspaper articles; information on website; segment for local cable TV; stormwater insert in water bills	Stormwater / sewer committee; Public facilities committee (sub-committee of Board of Aldermen); Board of Aldermen	Simp-lified fee structure	Flat rates for residential and non-residential properties	Treat as single family but billing tied into number of water meters	Median lot size and impervious area based on represent-ative samples of residential and commercial properties	Within Department of Public Works (DPW) and existing water and sewer utility	Use water and sewer bills and tied into number of water meters
Reading, MA	June 2006/ Sept. 2006	Three years	Board of Selectmen presentations; stormwater newsletter; information on website; "Reading Notes;" local newspaper articles; "Your Community Connection"	Water/ sewer/ stormwater manage-ment advisory committee; Board of Selectmen; Town Meeting	Refined fee structure	Flat rate for residential; variable rate for non-residential	Treat entire complex as a non-residential property	Average impervious area	Within DPW and existing water and sewer utility	Use water and sewer bills

Table 11, cont. Stormwater Financing Mechanisms Development Considerations

City	Fee Enacted/ Bills Sent Out	Develop-ment Period	Public Education	Approval Process	Start-Up Strategy	Fee Structure	Multi-Family Approach	Fee Basis and Data Collection	Organizational Structure	Fee Collection
South Burlington, VT	March 2005/ July 2005	Four years	Public presentations; stormwater brochures; stormwater website; breakfast meetings with largest utility rate payers; stormwater flyer; usage of regional stormwater materials	Stake-holders group of city employees and private residents; City Council	Refined fee structure	Flat rate for residential; tiered rate for others	Treat complex greater than triplex as a non-residential property	Actual amount of impervious area	Within Stormwater Division of DPW	Use water bills

Table 12. Stormwater Financing Mechanism Rate Structure and Budgets

Community	Property Characteristics		Equivalent Residential Unit (ERU)	Rates		Exemptions or Discounts	Credits	FY07 Storm-water Program Revenue	FY07 Stormwater Budget Expenses
	Residential	Non-Residential		Residen-tial	Non-Residential				
Newton, MA	Median lot size = 10,062 ft^2 Med. impervious area (IA) = 3,034 ft^2	Med. lot size = 19,565 ft^2 Med. IA = 19,138 ft^2	1 ERU = 3,034 ft^2	Single, two-family, and multi-family = $6.25/qtr or $25/yr	Commercial and industrial = $37.50/qtr or $150/yr	Discount - Elderly (30%)	Not in effect; Anticipates FY08 credits for recharge BMPs	$575,000	FT stormwater engineer, pollution prevention, maintenance/ drainage projects, water quality sampling, investigations and corrective actions, personnel training, public education and outreach
Reading, MA	Ave. IA = 2,552 ft^2	Ave. IA = 16,526 ft^2	1 ERU = 2,552 ft^2	Single and two-family = $9.96/qtr or $39.84/yr	Multi-family, commercial, industrial rate of $39.84/2,552 ft^2	Exemption - undeveloped property Discount - Early payment (10%)	Stormwater BMPs with max. credit of 50%	$357,000 (Enterprise Fund only)	New laborers, stream and drainage maintenance, drainage system mapping, IDDE

Table 12, cont. Stormwater Financing Mechanism Rate Structure and Budgets									
Community	**Property Characteristics**		**Equivalent Residential Unit (ERU)**	**Rates**		**Exemptions or Discounts**	**Credits**	**FY07 Storm-water Program Revenue**	**FY07 Stormwater Budget Expenses**
	Residential	**Non-Residential**		**Residen-tial**	**Non-Residential**				
South Burlington, VT	Ave. IA = 2,700 ft^2	NA	1 ERU = 2,700 ft^2	Single-family = $13.50/qtr or $54/yr; Two-family = $6.75/qtr or $27/yr; Three-family = $4.50/qtr or $18/yr	Multi-family, commercial, industrial fee based on amount of impervious area using a tiered rate	Exemption – Limits of railroad track right-of-way	No residential credits; Non-residential credits - Stormwater Treatment Practices w/ max. credit of 50%; MS4 credit w/max. credit of 10%; education credit w/max. credit of 10%	$1.1 million	Capital projects, maintenance and operations, engineering and planning, regulation and enforcement, water quality programs, special services, administration and management, coverage requirements, reserve funds, and misc. overhead

6.2 Challenges and Lessons Learned

6.2.1 Challenges

Although the municipalities experienced very different utility development processes and yielded different rate structures, common challenges and positive experiences emerged from discussions with the three municipalities. All three of the municipalities interviewed attached the stormwater utility to the water bill, which aided in implementation but yielded many problems. For Newton, tying the stormwater utility to the water bill required them to charge based on the number of water meters. For Reading and South Burlington, there was public confusion for homeowners who suddenly received a new bill and those who received multiple bills. These problems were rectified through GIS and having educated stormwater staff who could address public concerns.

The City of Newton has experienced problems due to the short development time period. The short time frame led to a simple fee structure and uniform rate that is somewhat inequitable for non-residential properties. Credit and abatement procedures were not in place before the utility. Newton hopes to address both of these problems by FY08.

Reading encountered problems from municipal departments who were not prepared to pay for the stormwater utility. To this end, Reading recommends determining ahead of time which departments will pay for the utilities on town owned land. In addition, it is important to inform municipal officials, school boards, and church members in the public education before implementation. Reading also experienced delays in the stormwater utility development, which were not anticipated, that ensured the legality and equity of the utility.

The disadvantage of South Burlington's tiered system is that it is based solely on amount of impervious surfaces. To receive a significant decrease in the utility bill, property owners must remove impervious area, not just install stormwater BMPs. Despite this problem, South Burlington found that basing their utility on the amount of impervious surfaces maintains a stable utility structure and revenue source.

6.2.2 Lessons Learned

Based on the experiences of these municipalities, there were several factors that aided in stormwater utility development and implementation. These include public education, development of credit procedures before implementation, and utilizing GIS in the development stage. Educating the public before the implementation of the utility is invaluable to assure public acceptance and to reduce the number of complaints. Also, it was imperative to educate staff and prepare them to answer public questions before the stormwater utility implementation. Another important consideration was to develop of a credit or abatement process before utility implementation. Specifically, municipalities should consider which personnel or departments will review the abatement applications, approve applications, determine the abatement qualifications, and the abatement amount before the utility is implemented. Another factor is GIS, which is very important when

developing the rate structure, calculating the bills, and creating a justifiable methodology. If a municipality is considering developing the stormwater utility in-house, they should increase GIS staff with either full time or temporary employees who are highly skilled in the technical aspects of GIS.

Municipalities considering a utility should anticipate that the utility implementation will require research and a potentially long political process. Additionally, delays may occur along the way which will slow down the process, and these should be expected. Sufficient time to fully consider the utility and possible complications will ensure a stronger utility overall.

From the individual suits, Reading learned that it was important to choose the billing method carefully. It was imperative to be able to justify the methodology and understand other possible billing options, such as taxes vs. fees. However, it is important to distinguish if the opposition is community-wide or just a few opinions.

Municipalities should consider the cost of utility development, which can be done in-house or through a consultant. If the utility is developed in-house, it is important to account for staff time and expenses in the development costs. Reading and Newton developed their utilities entirely in-house, although to aid in this process, Reading hired additional GIS staff. In contrast, South Burlington hired two consulting firms for assistance in development and implementation of the utility, which was more expensive than developing the utility in-house.

7.0 CONCLUSIONS

CRWA investigated the development and implementation processes of stormwater financing mechanisms in three New England municipalities: South Burlington, Vermont, Reading, Massachusetts, and Newton, Massachusetts. CRWA conducted in-depth interviews with staff associated with the utility development and implementation and studied the materials each municipality prepared during the utility process. In addition, CRWA obtained and reviewed stormwater financing materials available over the internet including guidance documents, case studies, journal articles and public education materials. From investigating these three municipalities, several conclusions can be drawn about the development of a stormwater utility; the need for sufficient time to develop the utility, the benefits of public education prior to the utility development, basing fees on impervious surfaces, and utilizing GIS in the rate structure methodology.

Time is one of the most important considerations in developing a new source of funding for stormwater management. While some communities, like Newton, may find that rapid development and implementation of a stormwater utility is a priority, others may benefit from a longer planning and design process. In the case of rapid program development, communities should anticipate the need to modify or adapt the program over time in response to unforeseen needs. In general, time-consuming activities include full investigation of the current municipal stormwater budget, the needs and priorities of a

desired stormwater program, and the most equitable rate structure to generate the necessary revenue.

It is also important to anticipate and plan for delays in the process, such as in the case of the Town of Reading where both Town Counsel and the MA Department of Revenue had to review the program before the approval of Town Meeting. During the development process, municipal staff should also allow for enough time to fully investigate possible public opposition and determine if it is a consensus opinion or just a vocal minority. With adequate time, stormwater staff should also coordinate with local stakeholder groups to obtain public input and feedback during utility development, which can lead to a stronger utility and greater public acceptance. Additionally, their involvement can help satisfy the public involvement component of the NPDES Phase II stormwater program.

Educating the public before the implementation of the utility is invaluable in assuring public acceptance and reducing complaints. It is important to explain to the public the local stormwater issues, the reasons for needing a stormwater financing mechanism, the environmental and public benefits of adopting a utility, and the differences between a utility and a tax. For example, South Burlington conducted targeted education to the property owners who would receive the highest utility bills. This involved only a small investment of stormwater staff time and money, but yielded greater public acceptance among a population that had potential to be the most vocal opponents. Also, it is imperative to educate municipal staff that is involved in any aspect of the stormwater utility and the management program before sending out the first utility bills. Staff should be prepared to respond adequately and efficiently to public questions, concerns, and/or complaints after the implementation.

Developing the stormwater utility rate structure based on the amount of impervious area of a property is equitable and defensible because it is directly related to runoff volume and pollution potential. In two of the three case studies, calculating the impervious area of each property was time and labor intensive and dependent on aerial photography or satellite imagery, in combination with GIS. However, now that the methodology is fully developed and in place, it is relatively straightforward to update as development changes over time and to refer to when questions arise related to stormwater utility bills. GIS is an important tool for establishing the billing system and connecting parcel information with the utility rate structure.

8.0 REFERENCES

Delaney, J.E., Honetschlager, K., and McIntire, E.D., 2006. *Establishment and Implementation of Reading's Storm Water Utility.* New England Waterworks Association.

Delaney, J.E., Honetschlager, K., and McIntire, E.D., 2007. CRWA Stormwater Financing Case Study Interview with the Town of Reading, Massachusetts. 6 February 2007.

Hinds, Juli Beth, and Betsy McDonough, 2007. CRWA Stormwater Financing Case Study Interview with the City of South Burlington, Vermont. 13 February 2007.

Kaspersen, J., 2000. "The Stormwater Utility: Will it Work in Your Community?" *Stormwater* 1(6). http://www.forester.net/sw_0011_utility.html

Lehner, et al., 1999. Stormwater Strategies: Community Responses to Runoff Pollution. Washington, D.C. Natural Resources Defense Council, [Online]. Available: http://www.nrdc.org/water/pollution/storm/stoinx.asp.

Morandi, L., 1992. "Wastewater Permitting and Finance: New Issues in Water Quality Protection." NCSL State Legislative Report.

National Association of Flood and Stormwater Management Agencies (NAFSMA), 2006. Guidance for Municipal Stormwater Funding.

Pilzer, S., 2003. "Griffin a National Model for Stormwater Solutions." Georgia Public Policy Foundation. [Online]. Available: http://www.gppf.org/article.asp?RT=20&p=pub/Water/stormwater.htm

Reese, A.J., 2003. "Funding Phase II Storm Water Programs." AMEC Earth and Environmental, Inc. Nashville, TN.

Rose, Maria Pologruto, 2007. CRWA Stormwater Financing Case Study Interview with the City of Newton, Massachusetts. 11 January 2007.

US EPA NPDES website, 2007a. 'Phases of the NPDES Stormwater Program.' Updated 2/2/07, accessed 2/21/07. http://cfpub.epa.gov/npdes/stormwater/swphases.cfm

US EPA NPDES website, 2007b. 'Stormwater Frequently Asked Question.' Updated 2/1/07, accessed 2/28/07. http://cfpub.epa.gov/npdes/faqs.cfm?program_id=6

US EPA, 2005a. Stormwater Phase II Final Rule: Small MS4 Stormwater Program Overview. Fact Sheet 2.0. Office of Water. EPA 833-F-00-002.

US EPA, 2005b. Stormwater Phase II Final Rule: Public Education and Outreach Minimum Control Measure. Fact Sheet 2.3. Office of Water. EPA 833-F-00-005.

US EPA, 2005c. Stormwater Phase II Final Rule: Public Participation/Involvement Minimum Control Measure. Fact Sheet 2.4. Office of Water. EPA 833-F-00-006.

US EPA, 2005d. Stormwater Phase II Final Rule: Illicit Discharge Detection and Elimination Minimum Control Measure. Fact Sheet 2.5. Office of Water. EPA 833-F-00-007.

US EPA, 2005e. Stormwater Phase II Final Rule: Construction Site Runoff Control Minimum Control Measure. Fact Sheet 2.6. Office of Water. EPA 833-F-00-008.

US EPA, 2005f. Stormwater Phase II Final Rule: Post-Construction Runoff Control Minimum Control Measure. Fact Sheet 2.7. Office of Water. EPA 833-F-00-009.

US EPA, 2005g. Stormwater Phase II Final Rule: Pollution Prevention/Good Housekeeping Minimum Control Measure. Fact Sheet 2.8. Office of Water. EPA 833-F-00-010.

Vermont Agency of Natural Resources, 2002. The Vermont Stormwater Management Manual; Volume 1- Stormwater Treatment Solutions.