Stormwater Financing/Utility Starter Kit

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Prepared for:

The 101 Cities and Towns of Greater Boston

DRAFT
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Stormwater Financing Toolkit: Overview

Stormwater management is a growing challenge for local governments. Municipalities must develop approaches that protect and enhance their water resources while also managing engineered systems to handle precipitation. These approaches to addressing stormwater impacts such as flooding and degradation of water bodies require a stable, long-term funding source.

The purpose of this Stormwater Financing/Utility Starter Kit is to provide municipal officials with the critical background information and tools required to establish a drainage fee and potentially a stormwater utility structure. The Kit provides a brief overview of the impacts of polluted stormwater, and the importance and establishment of this funding mechanism. The Kit is then broken down into discrete modules that municipal officials can reference independently, depending upon their needs:

- Module 1. Financing Options
- Module 2. Developing Rates
- Module 3. Administration Options
- Module 4. Public Education and Outreach Programming

Who?

The Metropolitan Area Planning Council (MAPC)'s Environmental Division provides technical assistance and policy guidance to the 101 municipalities within the Metropolitan Boston Region on a wide range of environmental issues, including non-point source pollution and stormwater management, water resources planning and policy, brownfields assessment, coastal and ocean resources, land conservation and open space planning, and climate change. MAPC has been working with our communities on nonpoint source pollution for decades and has participated on numerous water-related boards and committees, including the Massachusetts Low impact Development Working Group and the Massachusetts Water Infrastructure Finance Commission.

It has become evident that communities continue to struggle to bear the burden of the significant and increasing costs associated with stormwater management. Ultimately, however, nonpoint source pollution is everyone's responsibility: owners or renters of property with impervious surfaces (rooftops, driveways, walkways, and roadways), truck or automobile drivers, and municipalities that own and maintain impervious surfaces. That is why MAPC's approach includes municipal financing strategies as well as public outreach and education.

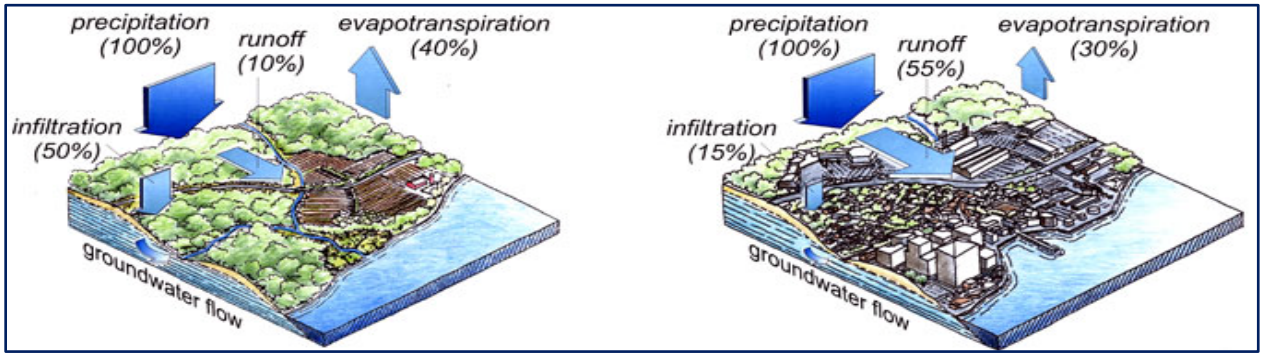
What/When?

Stormwater is the term used for describing the occurrence of rain or snow falling on an impervious surface that "runs off" across these surfaces instead of seeping into the ground. Typically stormwater is collected and conveyed through an engineered drainage system to ultimately

discharge to a nearby water body. Normally, in undeveloped areas, rain or melted snow infiltrates into the ground, allowing for recharge and filtering. However, as more of the landscape is covered with impervious surfaces that prevent these processes, stormwater has become an issue that increasingly affects people's lives and the environment through impacts on a community's water quality and quantity.

The images below show the difference between the natural water cycle where precipitation primarily infiltrates the ground with limited runoff, versus the water cycle in a developed area where impervious surfaces prohibit precipitation from infiltrating, thereby; creating a large amount of runoff – stormwater – that is typically treated like waste in an urbanized area and discharged away from the watershed.

Figure O.1. Natural Water Cycle versus Developed Area



It should be noted that Massachusetts has a high annual rainfall measurement, as compared to other states. Annual precipitation averages about 45 inches, the 12th highest in the nation, and is fairly evenly distributed throughout the state. Average annual evaporation from open water surfaces ranges from about 26 inches in Western Massachusetts to about 28 inches in the eastern half of the state. Yearly runoff ranges from about 20 inches in Cape Cod to about 32 inches in the northwestern corner of the state. The lowest runoff generally occurs during July, August and September, when evaporation rates are high. Runoff is highest in March in the eastern sections of the state and April in the western sections and at higher elevations, when evaporation rates are low and snow melt augments runoff from precipitation.

Nonpoint source pollution (NPS) occurs when rainfall or snowfall accumulates on impervious surfaces and then runs off these surfaces, carrying pollutants that have been deposited on them, eventually discharging them into surface water bodies (lakes, rivers, wetlands, and estuaries) and ground water. Unlike pollution from industrial and sewage treatment plants, NPS pollution comes from many diffuse sources, including various land uses and human activities (see Table 0-1).

Impervious surfaces are impenetrable, thereby not allowing water to infiltrate into the natural ground below. These include soils compacted by urban development, rooftops, roads, sidewalks, driveways and parking lots. Reducing infiltration of stormwater results in less recharge of the underlying groundwater aquifer, which in turn can lead to reduced streamflows within a watershed. For communities that rely on groundwater for their public water supply, this can also result in lower yields from their wells, as well as impacts on fisheries and other aquatic habitat.

Table O.1. Major Pollutants in Stormwater

Source	Major Pollutants
Public Infrastructure	Bacteria, metals, nitrogen, organics, petroleum products, phosphorus
Pavement Maintenance	Petroleum derivates from asphalt, temperature modification
Pavement Deicing	Chlorides, sediments, cyanide, sulfates
Transportation Vehicles	Fine particles, metals, petroleum products such as oil, grease, and PAH
Residential Activities	Bacteria, pesticides/herbicides, nitrogen, petroleum products, phosphorus, metals
Building Exteriors	Metals (chipped /eroded paints, corrosion of surfaces)
Development	Cement, concrete, high pH, metals, particulate matter, petroleum products, phosphorus
Landscape maintenance	Pesticides/herbicides, humic organics, nitrogen, phosphorus; litter (cans, food, paper, plastics; leaves and yard debris)
Pet Waste	Bacteria, nitrogen, phosphorus

In addition to nonpoint source pollution, increasing the velocity, volume and timing of runoff via hydromodification creates tremendous problems for both municipalities and the natural environment such as extreme flooding, and stream channel instability and streambank or shoreline erosion. As shown in Figure O.2., hydromodification practices include:

- Development of impervious surfaces (asphalt, concrete, most buildings, etc.);
- Deforestation or removal of vegetation;
- Construction of water conveyance structures (channels/ditches, levees, dams); and
- Dredging and/or filling of natural land contours for the purposes of new development (including transportation and other infrastructure) or navigation.

Figure O.2. Hydromodification Examples (Clockwise: Impervious/Deforestation, Ditch, Levee)

Stormwater Utilities versus Fee Structure

The term stormwater utility has been used throughout the country to describe the concept of an administrative entity created to implement a service fee to cover the cost of stormwater management. However, it is important to distinguish that a service or drainage fee can be

implemented in the absence of a stormwater utility. A stormwater utility is a public utility that is very similar in structure to a water/sewer utility that has fulltime staff (superintendent, engineers, administrators, etc.), and that is established to operate and manage a municipality's water/wastewater system. Most importantly, it is an entity that can efficiently manage a service fee and the municipal stormwater system for all residents' and business' benefit. In addition, with increased flooding from changing climate conditions, a stormwater utility can work to protect a community from water related disasters.

There are a number of options, such as general fund allocations and grants, for funding stormwater management projects and programs. However, these are not long-term, sustainable sources of funding. Although this Kit discusses all funding options, our primary recommendation is for municipalities to consider implementing a drainage fee under the administrative set-up of a stormwater utility, which has been found to be the most reliable, effective long-term operation.

Originally implemented by large urban municipalities in the 1970s as an experimental way of funding flood control measures, stormwater utilities have become increasingly popular and effective methods for cities and towns to finance drainage and flooding projects in their communities. Stormwater utilities have proven to provide a stable and equitable source of financing for stormwater programs, which have regularly received short shrift under General Fund allocations.

Instituting the Legal Framework

The first question raised in determining whether a drainage fee and/or utility are viable options is always: "is it legal?" In Massachusetts (and in most all states in the U.S.) municipalities have been granted the authority by state legislation to establish a stormwater fee system/utility. There are state laws that allow a municipality to charge utility fees and grant authority to manage stormwater, just as utility fees are charged for managing and providing drinking water, sewering, and other public services. Massachusetts General Law (MGL) Chapter 40 Section 1A defines the word "district" as "a fire, water, sewer, water pollution abatement…or any other district" formed for the purpose of carrying out any town/city functions allowed under Chapter 40. MGL Chapter 40A Section 5 describes the procedures for approval of zoning, ordinances, and regulations at the local level. Local stormwater regulations can be revised or added in order to authorize a drainage fee and/or utility. It should be noted that changes to a local bylaw (town) or ordinance (city) require a 2/3 majority vote of approval at special or annual town meeting or a 2/3 majority approval by city council and the mayor, respectively. MGL Chapter 83, Section 16 is one of the most critical pieces of legislation in terms of drainage fees, since it authorizes localities to charge fees and develop a utility to support stormwater management activities. Lastly, MGL Chapter 44, Section 53F ½ is also critical since it allows for the establishment of a separate account called an "Enterprise Fund" for the fees and also for utility operation. (The concept of an Enterprise Fund will be discussed in further detail in Section II: Funding Options.)

There are a number of strategies commonly used to formulate equitable fee structures for stormwater utilities. Typically, the utility fee is based on the amount of runoff produced solely by a property's impervious surfaces. Under this model, impervious surface area is calculated statistically based on median impervious areas for different land use types. According to the Natural Resources Defense Council, case law suggests that "a rate will be deemed valid where the:

- Revenue generated benefits for the payers, primarily even if not exclusively;
- Revenue is only used for the projects for which it was generated;
- Revenue generated does not exceed the costs of the projects; and

- Rate is uniformly applied among similarly situated (from a runoff view point) residents."

Municipalities may allow rates that generate surplus funds, as long as the excess money is not diverted for other purposes.

Drainage fees can be levied for any user of a municipal (or regional) stormwater system. Fees can apply for an entire community, if the municipal system covers the whole land area, or only to a portion of the municipality, as long as the rate structure (charges to consumers, often by type) is equitable.

Where?

Stormwater occurs in all developed land areas when precipitation (rain or snow) accumulates. Stormwater is especially prevalent in urbanized areas. The U.S. Environmental Protection Agency (EPA) defines urbanized areas as:

> "Land areas comprising one or more places, and the adjacent densely settled surrounding area that together has a residential population of at least 50,000 and an overall population density of at least 1,000 people per square mile."

However, most Massachusetts municipalities must address stormwater management, as authorized under the Clean Water Act Section 402: National Pollutant Discharge Elimination System (NPDES).

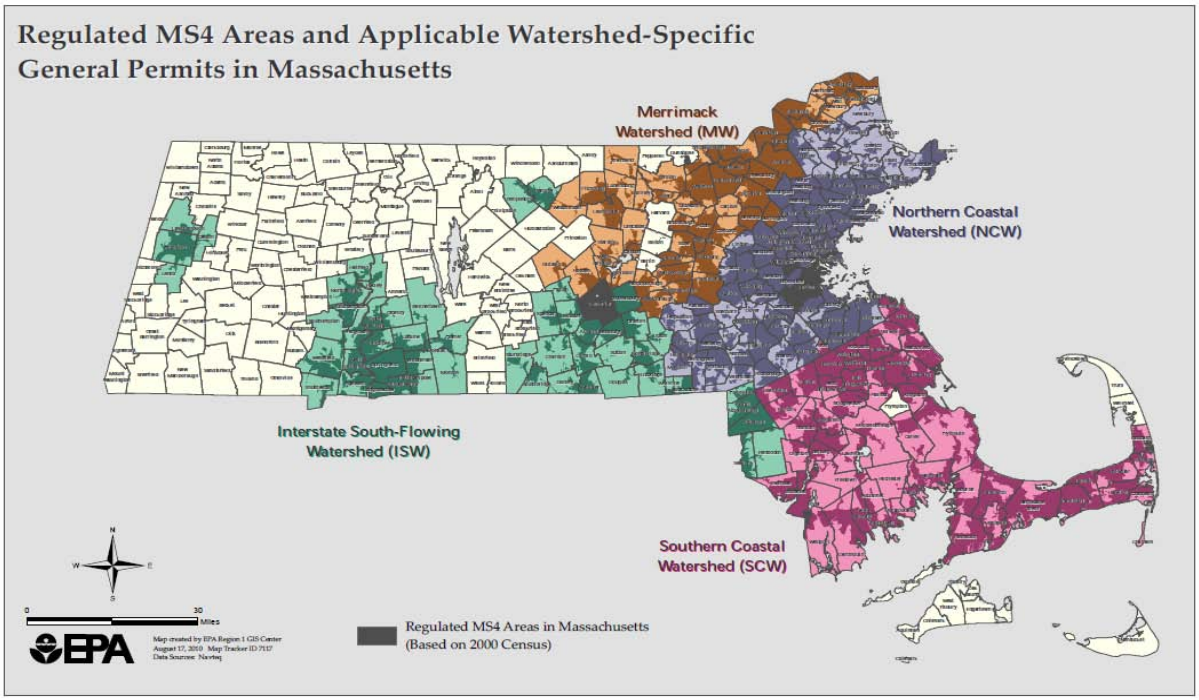
The NPDES program splits permitting into two phases:

- Phase I requires medium and large cities or certain counties with populations of 100,000 or more to obtain NPDES permit coverage for their stormwater discharges (in Massachusetts, this applies to Worcester and Boston); and
- Phase II requires regulated small Municipal Separate Storm Sewer Systems (MS4s) in urbanized areas to obtain NPDES permit coverage for their stormwater discharges.

An MS4 is defined by EPA as a storm sewer (stormwater) system that is: 1) owned by a state, city, town, village, or other public entity that discharges to waters of the U.S.; 2) used to collect or convey stormwater (i.e. storm drains, pipes, ditches, etc.); and 3) not a combined sewer system or part of a Publicly Owned Treatment Works (sewage treatment plant).

As shown in Figure 0.3., all but one of the communities within the MAPC Region are included under one of the Commonwealth's MS4 permits, which are grouped into four watershed areas: the Northern Coastal Watershed and the Merrimack, Southern Coastal, and Inter-State Watersheds.

Figure O.3. Regulated MS4 Areas



Why?

The rapid growth and development of many towns and communities throughout the Commonwealth has begun to significantly impact the efficacy and safety of stormwater infrastructures. As additional land is developed and covered with impervious surfaces such as roads, sidewalks, and rooftops, the volume and rate of stormwater runoff generated is increasing faster than existing stormwater facilities and rivers and streams can handle, often causing increased flooding, bank erosion, and scouring. According to a 2007 study by the Oregon Environmental Council; one acre of paved parking space creates sixteen times the runoff for a meadow of the same size.

Environmental Impacts of Untreated Stormwater

Stormwater is the leading source of water quality and quantity problems in the nation and in Massachusetts. Nonpoint source pollution related to stormwater occurs in every Massachusetts community causing great detriment to our surface water bodies and ground water supply. According to the *Final Massachusetts Year 2010 Integrated List of Waters*, approximately 60% of our surface water bodies do not meet Clean Water Act or Massachusetts Surface Water Quality standards. Polluted stormwater entering into our water bodies creates contaminated shellfish beds, causes beach closures, eutrophic conditions, and habitat loss. Polluted stormwater that infiltrates to groundwater can also contaminate drinking water sources. Stormwater management facilities that are not sized for flood conditions create a public health and safety hazard as well as an additional cost burden on the municipality. In addition, treating stormwater as "waste" and sending it away significantly alters the local hydrologic cycle, causing low-flow conditions in vulnerable watersheds.

Figure O.4 Natural Resource Impacts from Stormwater Pollution

Figure O.5. Human/Economic Impacts from Stormwater Pollution

Although the economic and public health and safely costs to society are often difficult to quantify, a study completed by Dodds in 2009[1] determined that the economic impacts of human-induced eutrophication due to stormwater nutrient pollution on US freshwaters were approximately $2.2 billion lost annually in recreational usage, waterfront property values, water treatment costs, and spending on the recovery of threatened and endangered species.

Climate change conditions have added an extra level of complexity to stormwater management that is critical for municipalities to consider. Climate change in coastal communities, primarily in the manifestation of sea-level rise and increased storm surge, results in increased coastal flooding and infrastructure damage. Inland communities have been experiencing more severe flood conditions due to increased intensity and frequency of storms, primarily in developed areas where inadequately sized stormwater management facilities are located. A municipality's sewer system may suffer increased inflow and infiltration during extended periods of flooding and high groundwater, overloading sewers, sewage pump stations, and treatment plants. Creating more natural, off-line stormwater systems designed to reduce velocity and peak-flow of a system (e.g. bioretention, and constructed wetlands) and/or retrofitting existing facilities to provide additional flood retention involves costs for which municipalities may not have the funding in the absence of a drainage fee.

Municipal Benefits

There are a number of benefits to municipalities from the establishment of a drainage fee or stormwater utility. First and foremost, establishing a drainage fee creates a collective responsibility for a community's water quality protection. The collective responsibility is logical, as all residents, property owners, businesses, and institutions with impervious surfaces on their properties are responsible for the creation of stormwater. Municipalities can also include tax-exempt properties to increase the number of properties contributing to the fund. In addition, depending upon their land management practices, nonprofit property owners could very well also be responsible for associated nonpoint source pollution in stormwater. Therefore, establishing a drainage fee system creates a mechanism by which municipalities can collect funds to use for stormwater management and water quality protection/improvements. Other municipal benefits include:

- A dedicated funding source: revenue generated by a stormwater utility can be used as a new, dedicated source of funds to supplement or replace the community's current stormwater management funding, enabling tax-based funding to be used for other community needs.
- Sustainable revenue: revenue generated by a drainage fee/stormwater utility is based on user fees and provides a constant, sustainable funding source that increases with the community's growth. Sustainable funding allows municipal stormwater programs to operate on a stable basis to support staff and equipment needs, maintain existing infrastructure, and adopt long-term planning for capital investments, maintenance enhancement, and staff development.
- Improved watershed stewardship: Through incentive programs that reduce user fees, a drainage fee/stormwater utility encourages better stormwater management, such as the use of low impact development practices (LID).
- Facilitation of National Pollutant Discharge Elimination System (NPDES) Compliance: Communities with an established drainage fee and/or stormwater utility will be more readily

[1] Dodds, Walter K. et al. Eutrophication of U.S. Freshwaters: Analysis of Potential Economic Damages. *Environ. Sci. Technol.*, **2009**, 43 (1), 12-19• DOI: 10.1021/es801217q. Publication Date (Web): 12 November 2008.

able to comply with the specific permit conditions contained in the impending next generation MS4 permit requirements. These permits are expected to include requirements that will be significantly more costly than the current MS4 permits.

What Fees Can be Used For

There is a large list of programs and projects that a drainage fee/stormwater utility can fund, as shown in Table 0.2 (not an exhaustive list). As indicated, drainage fees collected can be used to hire staff and obtain resources necessary to implement stormwater pollution prevention programs to reduce the amount of polluted runoff associated with development/redevelopment, and to reduce illicit connections and discharges to the storm sewer system. Revenues can also be utilized to implement stormwater planning and implementation projects such as engineering, inspection, construction, repair, maintenance improvement, reconstruction, and administration. Further information regarding how to assess what drainage fees can be used for can be found in Module 2, as well as in the Stormwater Utility Analysis Workbook.

Table O.2. Potential Expenditures

Stormwater Expenditures	**Description**
STORMWATER MANAGEMENT PROGRAM	
General maintenance & operations (DPW)	Routine cleaning, general maintenance, and day-to-day service operations.
Stormwater cleaning & treatment (contractual)	Costs of privately contracted facility to treat stormwater runoff.
NPDES compliance (MA4 permits)	Annual reporting and private consulting services.
Service requests	Reporting and responding to notices, complaints, and reported damage.
Master planning for stormwater	Develop a CIP based on Phosphorous Control Plan and infrastructure needs.
MS4 Stormwater Permit administration	Review of permits annually by consultants paid for by the developer(s).
Illicit discharge detection and elimination	Assume 10% of outfalls have illicit discharge. Estimate cost to identify source at approximately $1200 per hit. Removal costs should be the owner's responsibility.
Erosion/sediment control inspections	Estimate a 50% increase in workload due to additional maintenance and construction.
Catchbasin inventory plan	Field crews to inspect, record, and clean catchbasins on a regular schedule. Two to four times per year is recommended.
Septic, inflow and infiltration program	Cost of coordination between board of health and stormwater program.
Pesticide, herbicide and fertilizer program	Implement fertilizer optimization program. Assume coordination with multiple depts.
Spill cleanup program	Develop a priority response program based on high accident areas, significant pollutant potential, and proximity to receiving waters.
Groundwater and drinking water program	Technical review memo of drinking water quantity and quality in priority areas. Conclusions of reports to be considered in the improvement of the system.
Drainage monitoring	Schematic mapping of water drainage system with field verification of performance.
Code development and zoning support services	Review and update ESC, SW, IDDE as needed, report on local regulations affecting impervious areas and report on feasibility of green practices and other green techniques.

Stormwater Expenditures	Description
Hazard mitigation and flood insurance updates	Allowance for high hazard analysis by private consultant for specific areas of concern identified during the permitting process.
Waterfowl & pet waste management programs	Install waterfowl education signs at congregation areas and implement waterfowl deterrents. Install pet waste stations in strategic locations.
Street cleaning	Increase effort, fuel, supplies, and disposal to sweep streets.
Stream restoration/stabilization	Complete at least one stream restoration project every set number of years.
Ditch and channel maintenance	Assume cost of removal is borne by owner or sewer dept., cost of illicit discharge removal infrastructure improvements.
ADMINISTRATION EXPENSES	
Fee/utility implementation costs	Capital expenses associated with establishing HR to manage the program.
Billing costs	Costs associated with preparing and distributing invoices.
Administrative fees	General office operations and overhead.
Credits	Costs for administering and deducting expenses for properties that meet set compliance standards to reduce runoff.
Collection fees, delinquencies	Costs for processing receivables with contingencies for late or non-payments.
Legal support services	Legal review of regulatory changes every set number of years
Inter-municipal coordination	Adjacent municipalities to meet every set number of years to review and coordinate programs.
NPDES public education programs	Distribute at least two messages to residents, commercial, industrial, and construction constituencies and measure and report message effectiveness.
NPDES public engagement programs	Host public forums, regularly update websites and host regular workshops.

Proposed Next Generation EPA MS4 Permit Requirements

While most states are authorized to implement the NPDES Stormwater Program and administer their own MS4 stormwater permitting programs, EPA Region 1 is the permitting authority in Massachusetts due to the fact that the state has not accepted "delegation" of permitting authority under the Federal Clean Water Act.

Phase II MS4s are covered by a general permit, and all but one MAPC community have all or a portion of their most populated areas covered under Phase II General Permits. Massachusetts MS4s are currently covered under the 2003 NPDES General Permit for Storm Water Discharges for Massachusetts and New Hampshire. All MAPC communities have submitted a Notice of Intent for permit coverage, as listed on EPA's NPDES website. Each regulated MS4 is required to develop, document, and implement a stormwater management program (SMP) to reduce the contamination of stormwater runoff and prohibit illicit discharges. Overarching requirements of the SMP include, but are NOT limited to:

Development of a stormwater management program implementing six (6) minimum measures:

1. Public education and outreach: must provide information concerning the impact of stormwater discharges on water bodies, address steps and/or activities that the public can take to reduce the pollutants in stormwater runoff.

2. Public involvement and participation: comply with state public notice requirements in MGL Chapter 39 Section 23B and local public notice requirements and provide opportunity for the public to participate in the implementation.

3. Illicit discharge detection and elimination: develop, implement, and enforce a program to detect and eliminate illicit discharges to the municipal separate storm sewer that is not composed entirely of stormwater.

4. Construction site stormwater runoff control: develop, implement, and enforce a program to reduce pollutants in any stormwater runoff to the MS4 from construction activities that result in a land disturbance of greater than or equal to one acre.

5. Post construction stormwater management in new development and redevelopment: develop, implement, and enforce a program to address stormwater runoff from new development and redevelopment projects that disturb greater than one acre and discharge into the municipal system.

6. Pollution prevention and good housekeeping in municipal operations: employee training; maintenance activities for parks and open space, fleet maintenance, building maintenance; new construction and land disturbance; and roadway drainage system maintenance and stormwater system maintenance.

Permittees can utilize the Massachusetts Storm Water Management Policy, as authorized by the Massachusetts Wetlands Protection Act (MGL Chapter 131, Section 40), to implement some of the minimum measures.

The original 2003 MS4 permit was intended to be renewed by EPA with additional requirements every five years, but there has been a delay in the issuance of a permit renewal in Massachusetts. In the interim, the 2003 permits are still in effect.

A new generation of the MS4 permit has been developed by EPA, starting in New Hampshire. It is anticipated that this permit will serve as the model for the revised Massachusetts General Permits: the Northern Coastal Watershed and the Merrimack, Southern Coastal, and Inter-State Watersheds (see Figure 0.3). The new permits will be more rigorous and will likely include a number of additional more costly requirements, as summarized in Table 0.3.

Table O.3. Anticipated Requirements Based on the 2013 New Hampshire General Permit

Existing (2003 MA Permit)	**Anticipated Changes (2013 NH Permit)**
AREA OF COVERAGE	
MA, NH, Indian Country Lands, VT Federal Facilities.	MS4s owned by MA Cities and Towns, a state, county, or federal entity, and MA transportation agencies.
NOTICE OF INTENT REQUIREMENTS	
Due in 180 Days	Due in 90 Days
Stormwater Management Program (SWMP)	
Program implementing the 6 Min. Control Measures	Written plan that meets the terms and conditions of new permit
	List of receiving waters for all outfalls and interconnection, and the status of waters as impaired or TMDL
	Adequate funding source maintained for the implementation of the Program.
NON-NUMERIC EFFLUENT LIMITATIONS (e.g. Discharge to Impaired Waters)	

Existing (2003 MA Permit)	**Anticipated Changes (2013 NH Permit)**
Determine whether stormwater discharges contribute to a 303(d) listed water body.	Evaluate MS4 discharges to impaired waters and, if applicable, prepare Water Quality Response Plan within 1 year
	Fix any discharge "causing or contributing" to a violation of Water Quality Standards within 60 days of discovery.
	Implementation of WQRP, structural BMPs between 18 mo. & 3 yrs., nonstructural BMPs in 2 years, reassess in 4 years and if further reductions needed propose additional BMPs in 5 years.
Ensure that discharges will not cause an instream exceedance of MA water quality standards.	No net increase in discharges to impaired waters from new or increased sources (will also likely apply to other waters in MA).
BMP recommendations for stormwater discharges for TMDLs w/ a pollutant waste load allocation.	Discharges must be consistent with TMDL waste load allocation where applicable.
PUBLIC EDUCATION AND OUTREACH	
Info on the impact of discharges on water bodies and steps/actions to reduce the pollutants in runoff	Educational program to: residents, businesses, institutions, commercial facilities, developers, and industrial facilities.
Minimum of 2 educational messages over the permit term to the 4 audiences.	Number of messages same but within 5 yrs. & must define goals and evaluations methods and report on effectiveness.
PUBLIC PARTICIPATION AND INVOLVEMENT	
Opportunities for the public to participate in implementation and review of SMP program	Minimum 1 annual opportunity to participate in "review and implementation" of SWMP and post documents online.
ILLICIT DISCHARGE DETECTION AND ELIMINATION (IDDE) PROGRAM	
Develop, implement, and enforce program to detect and eliminate illicit discharges.	Written IDDE Program in 1 year that includes:
	Assessment/ranking of outfalls for contamination potential and health risk
	SOP for outfall screening and sampling. Include ammonia, chlorine, conductivity, temp, salinity, surfactants, and bacteria, plus TMDL or impairment parameters.
	SOP for catchment investigations and to prevent illicit discharges (employee training, spills, etc.)
	Indicators to track IDDE program progress.
	Annual training for employees involved in IDDE.
	Inventory all known SSOs within 120 days, notify EPA/DEP of activations, report annually, eliminate ASAP.
	System map in 2 years with full details (connectivity).
	Outfall/interconnection inventory: location and condition in 1 year and label in field in 5 years.
	Dry weather screening/inspection/sampling done in 3 years.
	80% of PROBLEM catchments (by acres) investigated in 3 years, 100% in 5 years.
	40% of ALL catchments (by acres) investigated in 5 years, 100% in 10 years.
CONSTRUCTION SITE STORMWATER RUNOFF CONTROL	
Reduce pollutants from construction projects disturbing 1 or more acres	Review and update any existing materials as needed and include:
	Ordinance – covers land disturbance of 1 acre.
	SOP's for site inspection and enforcement.
	Standards for BMPs and design.
	Control of wastes (solid waste, truck washing).
	SOP for site plan review in 1 year.

Existing (2003 MA Permit)	Anticipated Changes (2013 NH Permit)
	Tracking/reporting # of site plan reviews.
STORMWATER MANAGEMENT IN NEW DEVELOPMENT/REDEVELOPMENT (Post Construction Management)	
Address runoff from new development and redevelopment disturbing 1 or more acres.	Smaller parcels is advisable.
Pass a bylaw/ordinance to address post construction runoff in new development/redevel.	Modify existing ordinance as needed to comply in 2 years.
	Report on street and parking design and potential LID changes in 2 years.
	Report on zoning and other changes to allow: green roofs, LID infiltration, and water harvesting in 3 years.
	Track changes in impervious sub-basin or catchment annually beginning with year 2.
	Inventory and prioritize town-owned infrastructure for retrofit potential (onsite & offsite imperv.) in 2 years.
GOOD HOUSEKEEPING AND POLLUTION PREVENTION	
Inspection procedures and schedules for long term structural controls.	Inventory owned "facilities" (parks and open space, buildings and facilities, and vehicle/equipment storage/fueling) in 6 months.
	Written O&M plan for owned infrastructure in 1 year, including:
	Plan to "optimize" and document catch basin cleaning/inspection.
	Procedures for sweeping and/or cleaning streets, sidewalks, and permittee-owned parking lots.
	SOP for sweeping everything once per year in the spring and reporting miles swept and volume of cleanings.
	SOP for appropriate storage of sweepings and CB cleanings.
	SOP for storage of salt/sand and minimization of salt and use of salt alternatives.
	SOP for inspection frequency of structures (CB, swale, detention, etc.) – at least annually for everything except CB.
	Written stormwater pollution prevention plan for owned maintenance garages, DPW yards and transfer stations in 2 yrs.
EVALUATION/RECORDS	
None	Annual self-evaluation that includes:
	Outfall monitoring data.
	Standard Methods for bacteria.
	Impairment and TMDL parameters.
	Additional samples to support effectiveness of evaluation.
	lst annual report 90 days after 1st yr anniversary of permit date. Annual reports to include:
	Cumulative data reported annually (previous years).
	Monitoring data by outside parties.
	Retain all records for 5 years – available to public on request.

EPA has recognized the critical importance of keeping water local, and therefore encourages the use of "green infrastructure or low impact development techniques; using vegetation and soil to manage rainwater where it falls, for stormwater management, which is less costly and more prescriptive.

How: Five Steps (The Five Ds)

In developing an effective stormwater drainage fee program, it is helpful for municipalities to follow MAPC's five general planning and implementation phases. Beginning with *defining needs* by assessing current water quality problems and conducting an accurate inventory of existing treatment strategies in town, municipalities should then *determine* an appropriate fee structure to cover improvement expenses. Subsequent to the study and design of the fee structure, it is recommended that municipalities *deliver* and implement a thorough public participation program and *develop* a clear management plan. These efforts should finally be consolidated and refined by *drafting* and implementing a comprehensive and actionable bylaw or set of regulations to implement and manage the mechanism of the new stormwater drainage fee program. This section summarizes MAPC's five planning and implementation recommendations with a particular focus on how to determine appropriate fee structures and how to draft effective regulations to help meet municipalities' unique political and fiscal challenges. These recommendations are described in more detail in the modules that follow this section.

1. Define Needs

It is critical for municipalities to determine what stormwater issues they are facing in terms of both natural resources and physical infrastructure prior to beginning a planning process for establishing a drainage fee or stormwater utility. Municipalities must gather and assess both water quality and quantity data to determine the state of subwatershed drainage, surface water bodies, and groundwater. As noted previously, stormwater has a great impact on both surface water and ground water; therefore the development of a drainage fee and a revised Stormwater Management Plan depends on this data for determining the amount of revenue needed to address these issues. In addition, determining the status of existing public stormwater management facilities, and possibly some private systems within a right-of-way or drainage easement, is critical to developing an appropriate revenue plan. For example, if there are a number of facilities failing and in need of repair, as well as a need to construct new facilities that will ensure water quality/quantity improvements, the revenue-generating plan must take this into account, possibly calling for a phased fee (e.g., higher fees for years 1-10, and gradually lowered fees after year 10 when most of the upgraded infrastructure has been paid-off). Further information regarding how to assess need can be found in Module 1.

2. Determine Funding/Fee Structure

There are a number of potential financing options to consider, with two primary fee structures to choose from. Fee structures for utilities and government programs, as in private businesses, can vary greatly depending on the type of service being provided and where the service is being provided. Setting an appropriate fee structure is crucial to ensuring the success and efficacy of any program. Regardless of the structure chosen, it is critical that the fee structure promotes credibility and ensures equity. While there are a number of strategies commonly used to formulate equitable fee structures for stormwater utilities, typically the fee is based on the amount of runoff produced by a property's impervious surfaces. Under this model, impervious surface area is calculated statistically based on the cumulative area of median building footprints and paved surfaces on a property. Further details regarding the methods to set a billing metric are discussed in Module 2.

3. Deliver Education and Outreach Program

Creating a successful outreach program requires a thorough understanding of your different audiences and researching and strategizing how best to reach them. Public outreach goes beyond just informing the public and moves them to action. This outreach takes a social marketing approach to water quality goals and focuses on increasing participation in water quality improvement efforts. Public outreach requires an understanding of the community, and the ability to create incentives and motivate people to take action. This type of intensive public analysis will allow Towns to customize their public education and outreach activities to meet situation-specific needs. Community groups and demographics will vary from town to town, but will generally include several types of groups that include students, business owners, young families, church groups, single adults, elderly and retired individuals. Each of these groups is characterized by different lifestyles, income and education levels, and different ideas and expectations about what home and community should be. Being able to speak cogently and respectfully to each of these groups without marginalizing the positions of others is a delicate and important skill that can determine the ultimate success of the campaign. Further information regarding developing and implementing an internal (municipal officials and boards) and external (public) participation program can be found in Module 3.

4. Develop Administrative Program

It is necessary to determine the capacity to take on additional responsibilities under a new drainage fee system/stormwater utility program. Other reasons to assess organizational capacity are to determine if the existing work is well-coordinated among departments and if efficiency can be increased either for the existing department or multi-department task force. Steps to assess capacity include:

- *Document existing conditions*. Determine what is being done currently to address stormwater, and what staff are assigned. Document person hours/budget. Determine if there are gaps in existing service delivery (e.g., whether different departments or divisions are clear on who is to perform specific tasks). Interviews with key staff should help determine this.
- *Review initial required work program under the new regulations*. Estimate the amount of hours/budget for the proposed program. (Note: There are dozens of required activities, but not all of them will be done simultaneously; some will already be in place, some may be phased over the life of the permit.)
- *Review the existing and proposed costs.* Determine how much more funding and how much more time – and whose time – will be needed to accomplish the initial work program.

5. Draft Bylaw/Ordinance/Regulation

In order for a municipality or multi-municipal entity to implement a drainage fee, the administrative department or new utility must be authorized via a local bylaw or ordinance. Often times, municipalities have already adopted their own Stormwater Bylaw or Ordinance in which language stipulating this authority can be inserted. In the absence of a local stormwater bylaw or ordinance a municipality could include statements regarding stormwater management within its wetlands bylaw or ordinance, including the authorization of a drainage fee or utility. However, it is advised that a municipality consider creating a new bylaw or ordinance in this instance, as a wetlands bylaw or ordinance is typically limited in its jurisdiction to areas within jurisdiction under the Massachusetts

Wetlands Protection Act. Therefore, municipalities would not be able to impose a drainage fee town or city wide. In addition, creating a separate stormwater or Low Impact Development (LID) bylaw presents an opportunity for the municipality to establish minimum requirements and procedures to control the adverse effects of stormwater runoff and nonpoint source pollution associated with new development and redevelopment.

There are a number of resources available regarding creating a proactive, authorizing bylaw or ordinance. First, the Massachusetts Smart Growth/Smart Energy Toolkit includes a model LID Bylaw that can be downloaded, altered, and utilized by municipalities for this purpose. A similar Model Stormwater Management Bylaw was created by the Horsley Witten Group for the Towns of Duxbury, Marshfield and Scituate. Last, MAPC established an online Stormwater Bylaw Toolkit webpage, which displays model bylaws and regulations that MAPC has created in partnership with six communities in the region.