



Stormwater Chapter

for the

York Comprehensive Plan Inventory & Analysis

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Planning Board at time of Adoption: (List)

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Appendix A – References Reviewed for Stormwater Chapter

Stormwater

Inventory and Analysis

This chapter is a portion of the Inventory and Analysis section of the York Comprehensive Plan. Its purpose is to provide information about stormwater management.

Comprehensive Plans in Maine must comply with the legal requirements of state law, specifically Title 30-A §4326. The law establishes that land use policy must be based on information and analysis, and accordingly the law establishes that comprehensive plans must contain an Inventory and Analysis section.

The Inventory and Analysis section of the York Comprehensive Plan is a series of technical reports on individual subjects (population, housing, land use, natural resources, etc.). Each is complete as a stand-alone report on its specific subject, but taken as a set they comprise the complete Inventory and Analysis section.

The text of this Chapter is organized into 3 sections. The first section provides an introduction to stormwater issues, including current practices and policies in place in Maine and nationally. The second section provides an inventory of the Town's existing infrastructure, policies and management practices, ordinances, development regulations and approach to financing stormwater related Town expenditures. The third section provides an analysis, comparing the existing York practices, policies, ordinances, regulations and financing approaches to the local and regional practices and policies described in the first section. Appendix A contains a table documenting the references reviewed in creating this chapter with some links for further information.

1 INTRODUCTION

Stormwater runoff is a major issue in the Town of York, as it is in many communities across the nation. Regulators have long known that stormwater runoff is impacted by changes in development of the natural environment. For example, developing a forested area with landscaped areas, buildings and parking areas will cause an increase in the quantity of water running off the site during precipitation events, and will decrease the quantity of ground infiltration of precipitation. When there are more impervious surfaces in an area (rooftops, roads and parking areas), there is more potential for stormwater runoff to become contaminated with food waste, litter, petroleum products and other contaminants that can harm aquatic life. Figure 1 provides an example of the changes that development can have on infiltration and runoff.

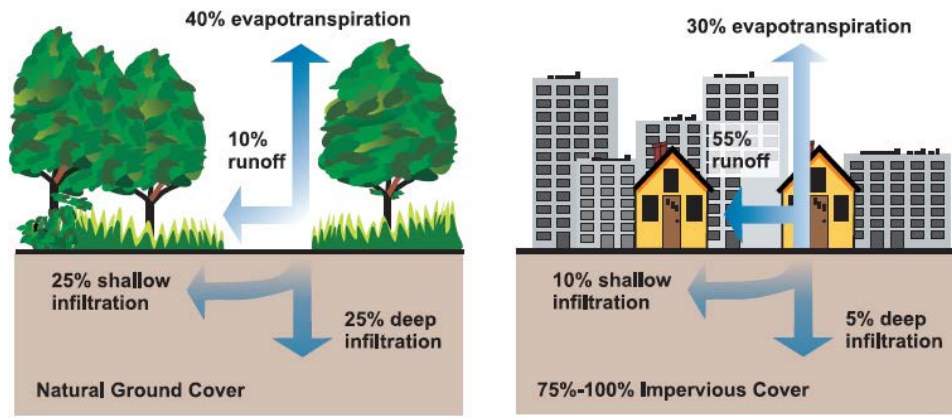


Figure 1 Development impacts on runoff and infiltration

As development occurs, more roads and access ways are created, which generally leads to municipalities having to improve and increase stormwater collection and conveyance systems, which further changes runoff/infiltration percentages (as exemplified in Figure 1). In coastal areas like York, precipitation from upland areas must eventually make its way to the ocean, or flooding will occur. Many coastal areas have developed the prime real estate near the ocean, sometimes restricting the flow to the ocean and causing flooding. Combined with sea level rise, which is currently conservatively estimated to increase 3.3 feet over the next 100 years, stormwater management has become a complex issue affecting many aspects of municipal operations.

Since the Clean Water Amendments of 1987, when the Federal Government mandated that stormwater be required to go through a permit process, regulations for stormwater discharges on new development and redevelopment have become increasingly more stringent. In addition, regulations mandating maintenance and inspections of municipal stormwater collection and treatment infrastructure have been implemented for communities with US Census-defined Urbanized Areas.

An Urbanized Area has a complex US Census Bureau definition. It is generally an area that has either a high population density, or a high percentage of impervious cover.

Because regulations for development sites have become more stringent and municipalities have become regulated for their municipal operations and infrastructure management, the cost to install and maintain stormwater infrastructure has increased. The following subsections briefly describe historic trends and provide some examples of current regional approaches to managing stormwater on development sites (Section 1.1) as well as guidelines regarding municipal operations in dealing with stormwater management (Section 1.2). The final subsection of this introductory chapter provides a discussion of current approaches to financing management of stormwater (Section 1.3).

1.1 Stormwater Regulations and Management for Development Sites

Prior to the early 1990s, stormwater in Maine was regulated primarily to control flooding, and to ensure no adverse impacts to groundwater. By 1997, the Maine Department of Environmental Protection (Maine DEP) had begun regulating large development sites for stormwater discharges of sediment and phosphorous (into great ponds), and put further restrictions on peak rate discharges from developments (Figures 2 and 3).

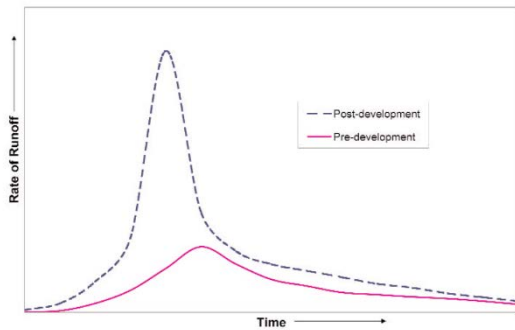


Figure 2 Natural Pre-development runoff (from forest and meadow areas) slowly seeps into the ground. With increased impervious cover, the peak rate of runoff increases significantly. DEP has been regulating this peak discharge since ~ 1997. (2005 DEP)

In 1999 and 2004, studies by the US Geologic Survey emerged identifying additional chemical pollutants in stormwater runoff (USGS 1999 and 2004). Concurrently, additional national studies identified that increases in percent impervious cover within watersheds directly correlate to decreases in water quality (CWP, 2003).

The federal government, states and municipalities began regulating stormwater from development sites for quality and quantity issues as a result of the studies beginning in approximately 2003. In 2005, the Maine DEP enacted significant changes to the primary state stormwater regulations (Maine DEP Rule Chapter 500 Stormwater). The changes required treating the first 1-inch of runoff from 95% of a site's impervious area in

order to improve the quality of the runoff. The changes also required controlling the total volume of the runoff (in addition to the peak rate as was previously regulated). By controlling the total volume of the runoff, the post development site discharges would be similar to the predevelopment discharges, protecting stream banks from erosion and stream beds from scouring (see Figure 3).

The new Maine State standards apply whenever development will create:

- One or more acres of impervious surface
- Five or more acres of developed area (area whose hydrologic function will change for the worse because of the development), or
- 20,000 square feet of impervious cover in a watershed of an urban impaired stream (listed in Chapter 502).



Figure 3 Increased volume of discharge can result in erosion of streambeds and banks (DEP 2005)



Figure 4 Example of Vegetated swale to promote infiltration. (EPA 2015)

The Maine Stormwater Management Guidance document was overhauled in 2005 to incorporate Best Management Practices (BMPs) such as buffer installation, infiltration via vegetated swales gravel wetlands, and other water quality treatment BMPs.

The Chapter 500 regulations are being revised again to incorporate Low Impact Development (LID) requirements, and the Maine Stormwater Management Manual will also be updated.

It is anticipated that the intensity/frequency/duration storm data that is required to be used for flooding calculations in implementing the Chapter 500 requirements will be updated to reflect new data as has been tracked by Cornell University on the Northeast Regional Climate Center website (NERCC 2015).

1.1.1 State Stormwater Programs

Around this time, other States also modified their development regulations to implement the same kinds of changes that the Maine DEP made.

For example, Massachusetts developed a comprehensive set of state regulations and companion guidance manual in 2008 that specifically requires infiltration methods be employed based on the capacity of the soil to infiltrate.

New Hampshire also implemented revised regulations in 2008 and developed companion guidance documents to assist practitioners in implementing the requirements. One of the documents, Innovative Land Use Techniques Handbook, contains specific examples of LID techniques that can be implemented, describes when the techniques are appropriate and when they are not, gives example language for ordinances and guidance for implementation. Topics covered include Lot size averaging, infill development, Conservation Subdivisions, and Village Plan Alternatives.

Low Impact Development (LID) is an innovative stormwater management approach with a basic principle that is modeled after nature: manage rainfall at the source using uniformly distributed decentralized micro-scale controls

1.1.2 Community Stormwater Programs

As communities began modifying their ordinances to come into alignment with new state regulations for stormwater quality, they began to realize that other elements of their local zoning ordinances and regulations also have a great impact on stormwater (e.g., open space requirements, landscaping and buffers, lot sizes, parking requirements, and road width specifications).

Large communities and counties such as Portland, Oregon and Carroll County, Maryland began to update their local stormwater development ordinances to incorporate new stricter state requirements, and also began to write their own comprehensive development guidance documents to specify performance standards for the overall development, using LID.

Most communities specify design standards and permitting for different categories of sites based on the size of the development, the quality of the water into which they are discharging, and whether or not there are potential flooding issues in the area. The following is an overview of the different categories, their basic requirements and a few examples from some of the more “stormwater” progressive communities’ programs that were reviewed (see Appendix A for additional examples and information):

Sites that disturb less than one acre of land have the least stringent standards and typically require permitting, but at a simplified level. Sediment and erosion controls are generally required, narrative descriptions and sketches are required showing where stormwater will discharge, and how quality and quantity will be treated, but no specific standard is applied. There is typically a minimum threshold below which no permit is required (e.g., Portland, Oregon exempts sites creating less than 500 square feet of impervious cover).

Sites that disturb more than one acre of land in areas where receiving waters are meeting their water quality classifications have requirements to implement LID and green infrastructure wherever possible and specific infiltration and runoff criteria are specified. These types of standards protect existing water quality from the adverse effects of pollutants. Additional restrictions on peak runoff control and total volume of runoff leaving the site help protect existing waters from stream bed and bank scouring and erosion. Greenville County, South Carolina requires developers to:

- Provide erosion and sediment control during construction;
- Control flooding for 2, 10, and 25-year 24-hour storm events, using either their own professional engineer, or using a Simplified Urban Design Model (SUDS) created specifically for flooding in Greenville County;
- Control pollutants leaving the site (remove at least 85% of the total suspended solids (TSS), and provide treatment of the first 1-inch of precipitation on all impervious surfaces, and retain the water on-site for at least 48 hours to promote infiltration). Developers are required to show how they are decreasing TSS using a water quality model such as the Simple Model (an EPA equation showing runoff concentration based on several site specific factors) or the Greenville County IDEAL model (an EPA model that has been modified to reflect regional soil types, topography and climate).

Generally these sites are required to submit full design drawings, calculations and narratives describing the work to be completed.

Sites that disturb more than one acre of land in area where receiving waters are either NOT meeting their quality classifications, or where receiving waters have been designated as outstanding resources typically have additional, more stringent requirements. Pollution control for specific parameters is typically required for sites discharging to impaired waters (waters not meeting their classifications). In Greenville County, SC, developers are required to show that their water quality treatment devices are removing any pollutants that are causing water quality impairments using one of the listed water quality models (in addition to the TSS removal required for sites discharging into unimpaired or outstanding resource waters).

The models that developers can use in the example provided above can be costly to develop and maintain. For example, development of these models requires obtaining sufficient wet-weather data to calculate “Event mean concentrations” of various predevelopment conditions (e.g., bacteria, nitrogen, phosphorous and total suspended solids concentrations in runoff from a forested area for several different types of storms). However these models can help control the adverse impacts developments are having on water resources. It should also be noted that typically one type of local model is developed to assess water quality impacts from development, and second type of local model is developed to address flooding impacts (on a larger more regional scale).

In New Hampshire, the New Hampshire DES is creating a watershed model that will be used to limit nitrogen contributions to the Great Bay. The results of the model may show that development and redevelopment regulations need to be changed to improve the quality of the Great Bay.

Also in New Hampshire, the UNH Stormwater Center created a watershed flooding model for the Lamprey River. However, the model is not useful for evaluating impacts from small developments (less than 20 or 50 acres) (Ballesterio 2015).

1.2 Stormwater Infrastructure Management for Municipalities

In addition to changes in regulations for stormwater discharges from private development, federal regulations for stormwater discharges from Phase II or “small” municipalities became effective across the nation in 2003. Phase I, or “large” municipalities with populations greater than 100,000 had been regulated for stormwater since 1990, but the first municipalities in Maine and New Hampshire became

regulated in 2003 with the Phase II regulations, and the issuance of the General Permit for Stormwater Discharges from Municipal Separate Storm Sewer Systems (General Permit for MS4s).

These MS4 General Permits are the drivers for municipal stormwater management across the nation. Effectively, the Phase I and Phase II communities have the most proactive stormwater infrastructure management because they are regulated to do so, and many implement additional optional mechanisms to improve management of stormwater runoff.

It is important to note that state regulations and permit requirements cannot be less stringent than federal requirements. That is to say, the state generated permit (such as is the MS4 General Permit in Maine) cannot be more lenient than a federal permit. The USEPA Region 1 has not issued an MS4 General Permit since 2003 (which applied to Massachusetts and New Hampshire). The Maine DEP has issued three permits since 2003 (the 2003 permit, another in 2008 when the 2003 permit expired, and another in 2013 when the 2008 permit expired).

The USEPA has issued several draft MS4 General Permits for both Massachusetts and New Hampshire, and these permit requirements have been significantly more stringent than those currently in force either in Maine or in Massachusetts and New Hampshire. When these EPA permits are finalized, the Maine Permit requirements will need to be revised to ensure they are at least as stringent as the EPA's.

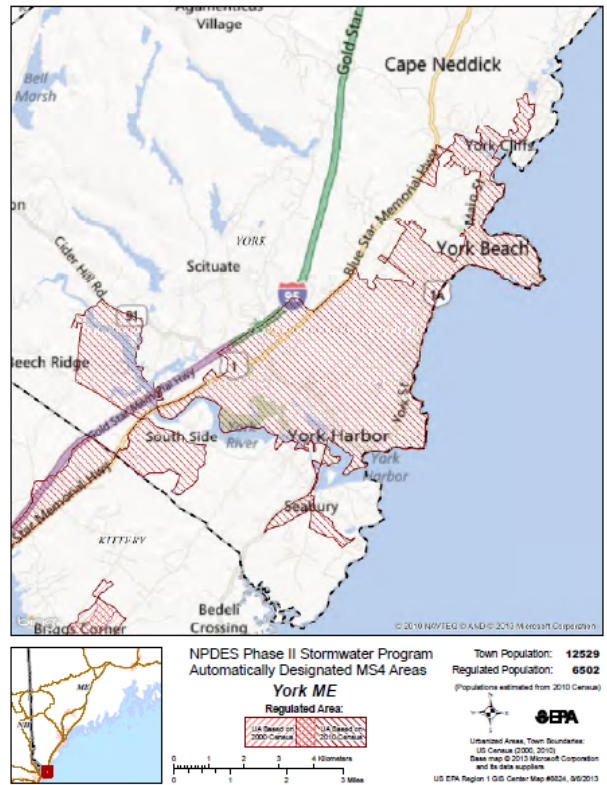


Figure 5 York MS4-Regulated (Urbanized) Area

Regulation of these municipalities is based on the US Census-define Urbanized Areas (agglomerations of census blocks with specific population densities and/or high impervious surface coverage). The Town of York became regulated by the Phase II program July 1, 2013 after the 2010 census identified the Town with an Urbanized Area. Figure 5 shows the regulated, Urbanized Area of the Town.

Each community must prepare a plan and implement requirements to address the following “Minimum Control Measures” (MCM):

1. Public Education on stormwater issues
2. Public Participation in the implementation of the stormwater program
3. Illicit Discharge Detection and Elimination (mapping of the storm drain system, and inspecting and correcting illegal discharges that have been made)
4. Construction Site Runoff Control for sites that disturb one or more acres of land
5. Post Construction Site Runoff Control for sites that disturb one or more acres of land

6. Pollution Prevention Good Housekeeping at Municipal Operations (including street sweeping, catch basin cleaning, maintenance of the storm drain system and good housekeeping at municipally owned properties).

Section 1.2.1 describes how communities regionally and nationally comply with Minimum Control Measures 1 through 5 and give a general description of what the permit requirements look like in the 2013 drafts MS4 General Permits that EPA issued for Massachusetts and New Hampshire. Section 1.2.2 describes how Phase II MS4 communities generally implement Pollution Prevention and Good Housekeeping Measures, and what the new draft EPA MS4 General Permit requirements look like.

Section 1.3.1 describes some important and potentially costly requirements proposed by the new draft EPA MS4 General Permits which related to correcting water impairments. If/when these new requirements become effective, municipalities will incur the costs to correct any impairments caused by stormwater runoff.

1.2.1 MS4 General Permit Requirements (MCMs 1 through 5)

The MS4 permits that have been issued across the nation are General Permits which effectively contain the same requirements for all regulated communities. For this reason, many communities band together and work cooperatively to implement the regulations.

1.2.1.1 Public Education Cooperative Efforts

The MS4 General Permits require education of the general public about stormwater issues. The Public education and public participation MCMs are particularly well suited to cooperative efforts.

A few examples of these efforts include:

- The Cumberland County Soil and Water Conservation District provides cooperative services for public education and training for the Portland, Maine based Interlocal Stormwater Working Group.
- The Pioneer Valley Planning Commission Coordinates the Massachusetts communities in the area of Springfield in cooperative efforts for public education, and has assisted them in understanding the advantages of implementing a stormwater utility.
- The University of Rhode Island Cooperative Extension/Healthy Landscapes provides educational information on native vegetation and sediment and erosion control techniques to regulated communities in Rhode Island.

These cooperative efforts can save communities staff time, printing costs, and consulting fees (though most non-governmental agencies that provide these services do charge a fee).

The draft EPA MS4 General Permit requirements are less stringent than the requirements currently contained in the Maine MS4 General Permit.

1.2.1.2 Illicit Discharge Detection and Elimination requirements

Illicit discharges are basically illegal discharges into the storm drain system. Examples include direct sanitary connections or dumping of paint or other liquids or solids. Because the storm drain system discharges directly without treatment, these illegal discharges can have significant adverse impacts on natural resources.

To implement the IDDE requirements, most Phase II MS4 communities have developed or are developing electronic infrastructure maps, are conducting inspections using either electronic or paper forms, and are conducting sampling and analysis of outfalls only when needed to try to identify the source of pollutants that have been observed in the system.

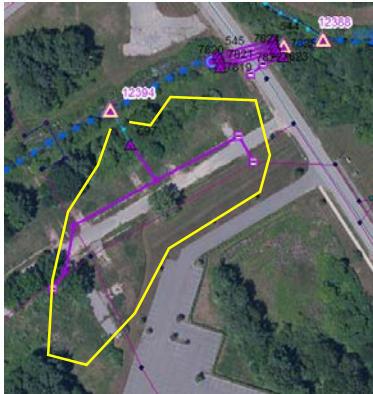


Figure 6 Draft New Hampshire Permit requires catchments be identified for each MS4 outfall as shown here.

The proposed EPA MS4 General Permit requires a much more detailed map that identifies the catchment area of each outfall in the community. Prioritization of the outfall will need to be conducted based on land use (high priority outfalls would be located in areas that have a high potential for illicit discharges, and low priority outfalls would be located in areas that have low potential for illicit discharges). Sampling and analysis will be required of all outfalls within 10 years of the permit issuance, but most of the high priority outfalls would need to be sampled and analyzed within 5 years during wet weather and dry weather (if flowing) for several specified parameters including pH, temperature, dissolved oxygen, conductivity, bacteria, and any parameters for which the water is impaired. Once illicit discharges have been identified and eliminated, follow-up confirmation sampling is required (one year after removal and again 5 years after removal).

These proposed changes will be costly and time consuming to implement.

1.2.1.3 Construction Runoff Control Requirements

Construction site controls are generally modelled after the EPA Construction General Permit which requires a specific sediment and erosion control plan and an inspection program for any construction site that will disturb one or more acres of land. Most communities conduct follow up inspections of construction sites for sediment and erosion control issues whether or not they are regulated by an MS4 General Permit. The current MS4 General Permits typically require more notification, more frequent inspections, and more documentation and record keeping than most municipalities would otherwise do.

Most communities follow the construction runoff control requirements as required (not implementing anything above and beyond the Permit).

The draft EPA MS4 General Permits have additional requirements that written procedures for municipal inspections be created and followed.

1.2.1.4 Post Construction Runoff Control Requirements

Current Post Construction Runoff Control requirements are to ensure that anyone who has private stormwater infrastructure maintains it so that it functions for its intended use. To complete this, MS4 communities pass ordinances requiring maintenance, and annual certification to the Town that the maintenance has been done.

Areas that are impaired for water quality must be inspected by the town or by someone who is certified in Post Construction inspections. The State of Maine has developed a post construction inspector certification course.

Most communities implement the Post Construction Runoff Control requirements as required (not implementing anything above and beyond the Permit).

The draft EPA MS4 General Permits specify that significant additional measures be implemented including:

- Evaluating municipal street design and parking standards to minimize stormwater impacts
- Evaluating municipal development regulations and adding in requirements for private developers to implement green infrastructure practices, where practicable
- Inventorying, evaluating and prioritizing municipal properties for their potential to be retrofitted with green infrastructure to reduce the adverse impacts of impervious surfaces. Communities are then required to implement the retrofits which will likely be very costly.

Green Infrastructure is similar to LID – it is also an innovative stormwater management approach. Green infrastructure uses vegetation, soils, and natural processes to manage water and create healthier urban environments.

These proposed post infrastructure requirements by EPA reflect the good practices being implemented regionally and locally for development sites that were described in Subsection 1.1 of this chapter.

1.2.2 Maintenance of Infrastructure and Pollution Prevention Good Housekeeping (MCM 6)

While most communities conducted maintenance of their infrastructure before becoming regulated by an MS4 General Permit, MCM 6 of the MS4 General Permit contains requirements to conduct annual street sweeping, catch basin cleaning to ensure no basin is more than half full of sediment, and preparation of pollution control documents for municipal properties.

The draft EPA MS4 General Permit Requirement's for this Minimum Control Measure are not significantly more stringent than the permit requirement for the Maine MS4 General Permit.

However, many MS4 communities do not have formalized Capital and Operation and Maintenance programs for their stormwater infrastructure, and these are required of both the Maine and draft EPA MS4 General Permit.

Though not required by the MS4 Permits, some of the more proactive MS4 communities across the country have implemented asset management programs to ensure their stormwater infrastructure retains a good or above average program. An asset management program for stormwater infrastructure is similar to an asset management program for other infrastructure in that it requires:

- Development and implementation of a formalized inspection program to assess the infrastructure for function and condition
- Replacement or repairs of the system at either defined times based on the life of the system (reinforced concrete and plastic pipes have a longevity of approximately 30 years, while metal culverts have a life of approximately 5 years), or on diminished function due to poor condition or damage.

Asset management systems help communities plan for maintenance and capital costs by maintaining their infrastructure in an average or above average condition, minimizing unexpected failures and the costs associated with emergency response.

1.2.3 Additional MS4 Requirements for Impaired Waters

The MS4 General Permits have increased requirements related to impaired waters in recent years. In Maine, the most recent General Permit has a special requirement for communities with waters that are impaired where a Total Maximum Daily Load Document has been prepared. These TMDL documents typically identify the sources of impairments and specify actions that must be taken to correct the impairments.

Most notably in Maine, the DEP issued a TMDL for statewide waters with Impervious Cover impairments. The Impervious Cover TMDL is based on many of the studies that identify the connections between increased impervious cover and water quality impairments. In particular they cite that sensitive species of fish decline in watersheds with 4-6% impervious cover and water bodies in watersheds with more than 12% impervious cover often fail to meet aquatic life criteria and narrative standards (Stanfield and Kilgore, 2006).

The Impervious Cover TMDL identifies the allowable percentages of impervious cover for approximately 30 watersheds with habitat or aquatic life impairments. The percentages range from 5% (for Frost Gully Brook in Freeport) to 16% (for Capisic and Nason Brooks in Portland). The TMDL says that watershed management plans must be developed by the MS4 communities whose systems discharge into these waters. The watershed management plans must identify the sources of water quality impairments such as: potential sources of pollution to the water ways (called hot spots), impervious areas that are directly connected to waters, or areas where riparian borders are insufficient to disconnect impervious cover, and promote infiltration. The Watershed Management Plan must then identify ways to correct the issues that were identified. Many of the LID and green infrastructure techniques are directly applicable to the impervious cover issues.

The EPA proposed MS4 General Permit contains even more stringent requirements for MS4 municipalities to begin addressing in a systematic manner stormwater related water quality impairments, whether a TMDL document has been prepared or not. Clearly, the new stormwater regulations being implemented are going to be more costly and time consuming to implement.

1.3 Financing Stormwater Programs

Because of the increased regulation for how communities are managing the stormwater runoff from their own roads, infrastructure conveyance systems, and municipal properties; capital and operational costs have increased. In addition, because the municipalities have had to increase regulation of private development, costs to conduct oversight have increased (increasing inspection requirements, and development plan review has become more technical and complex).

When the EPA MS4 General Permits are finalized, additional, more stringent and costly requirements will be imposed on all Phase II MS4 communities.

Historically, communities have paid for infrastructure operation and maintenance through the general tax fund, and have issued bonds for significant capital projects, or applied for grants. The increased regulations have pushed some communities to implement a dedicated stormwater user fee. Advantages and disadvantages these funding mechanisms is described briefly below:

General Tax Fund: While this form of financing provides a stable reliable income for the Town, some entities who receive stormwater services do not pay taxes, or pay lower taxes. For example, not-for-profit organizations do not pay local taxes but they do benefit from stormwater infrastructure related services. Also, facilities that have large parking areas without structures would generate a significant amount of stormwater runoff, but would not pay a commensurate amount of general tax.

Grant Funding: Although there are some grants available for stormwater infrastructure projects, they are limited. In addition, federal grant money cannot be used to implement any MS4 permit requirements. Grant funding also has the disadvantage of being unreliable as a consistent source of revenue and should only be counted on for single-event projects that are not considered a high priority. Often, grant funding is useful for non-structural programs, for project enhancements, or for non-critical projects that would not be constructed unless grant funds are available.

Bonding: Bonding is generally useful for initial capital improvements, not long-term maintenance or operational issues. Bonding is not a funding source like property or employment taxes or service fees but, rather, is a mechanism for borrowing money to make an investment in facilities, land acquisition, or major equipment. Payment of the bond debt is typically completed using the general tax fund. Many communities in Maine and across the nation use bond funding for capital projects.

State Revolving Loan Fund: The state revolving loan fund can be used to access low interest loans for capital projects. In Maine, these funds can be used to implement stormwater capital projects whether or not the projects are required by the MS4 program. As with Bonds, the debt service on the loan must be repaid, typically using the General Tax Fund.

User Fees: Whether in the form of plan and inspection fees or a stormwater utility, user fee funding has several advantages over other competing forms of finance including its equitability, stability, and adequacy. In addition, a significant benefit to having a user fee is that a community can implement a credit system that rewards developments that have a very low adverse impact on water quality from stormwater runoff.

South Burlington, Vermont recently implemented a stormwater user fee program to help pay for maintenance and capital expenditure associated with catch basin cleaning, street sweeping, and maintenance of its detention ponds, rain gardens, and other green infrastructure.

Maine laws allow user fees for stormwater services to be implemented at the community level. The following local communities have implemented stormwater user fees:

- City of Portland (to become effective in January 2016)
- City of Lewiston (became effective in 2007)
- City of Bangor (became effective in April 2014)

Summaries of the Maine-based user fee programs and a few other successful national user fee programs are described in the table in Appendix A.

Some disadvantages to implementing a user fee include its large initial effort and administrative cost. First, decisions must be made about which municipal services will be paid for with the fee (street sweeping, inspections, catch basin cleaning, debt service on bonds, watershed management plan implementation?). Then, municipal time and expense tracking systems must be modified or put in place to ensure that the services covered by the fee are being charged to the correct accounts, and that only those services are being charged to the fee accounts.

After that an entirely new billing system must be created and implemented. These fee systems are based on careful evaluations of the types of parcels present in a community, and how much impervious cover each type of parcel has. For example, the City of Salem, Oregon adopted a three tier fee-based system for single family homes:

- Parcels with less than 1,330 square feet of impervious area are charged \$3.32/month
- Parcels with 1,330 to 2,900 square feet of impervious area are charged \$3.80/month
- Parcels with more than 2,900 square feet of impervious area are charged \$4.26/month

All other types of parcels (duplexes, parking lots with no buildings, commercial buildings, and industrial buildings) are charged \$3.80 per ERU/month.

A good way of promoting good stormwater techniques and practices is to develop a credit system which would reward those who are implementing LID or green infrastructure that promotes infiltration and reduces adverse impacts on water resources.

For some communities, implementation of a user fee requires reorganization of some departments and hiring of new staff.

Important elements to implement include are:

- good communication to the general public about what the fee will cover,
- ensuring that no items are being accounted for twice when budgeting (since some items will be covered by the new fee, some other budget must be reduced by an equal amount),
- ensuring the public knows where to call for billing questions,
- ensuring sufficient municipal staff are available to respond to questions, and
- conducting good communications up front with entities that may be charged the fee who are not currently paying into the general tax fund.

An average residential parcel may have 3,000 square feet of impervious surface. This would be called an Equivalent Residential Unit (ERU) for a stormwater user fee. Commercial properties could be assessed based on how many ERUs are present on their parcel.

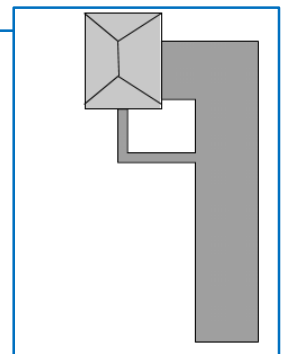


Figure 7 Example Equivalent Residential Unit

2 INVENTORY

2.1 York Regulations for Development

The Town of York regulations for stormwater runoff from development sites fall into three basic categories which are described in the following subsections: Site Plan and Subdivision Regulations, Zoning Ordinance, and other stand-alone ordinances.

2.1.1 Site Plan and Subdivision Regulations

The Town of York regulates new developments and redevelopment of land within its municipal boundaries primarily through the Site Plan and Subdivision Regulations, a stand-alone ordinance. The thresholds triggering this regulation are described in the Zoning Ordinance (Article 18). Generally, the regulation contains requirements to preserve natural and historic features, and provisions for parking spaces, street design, and stormwater drainage structures.

The regulations require that:

- stormwater management structures be designed to limit post-development peak discharge to pre-development levels for the 2-year and 100-year 24-hour storm duration based on rainfall data for Portland, Maine. No other stormwater quality treatment requirements are in force.
- each applicant submit a statement to the Planning Board documenting proposed Low Impact Design (LID) for the site, which will help to reduce stormwater volumes and help to enhance stormwater quality. The applicant is also required to submit technical documentation about the suitability of such designs.
- the Town be provided 20-foot easements along any natural water ways on privately developed land, and 20-foot easements for any stormwater infrastructure that will be turned over to the town so they may have access for maintenance and inspections. These easement requirements are important to assure the Town can implement the inspection requirements of the MS4 General Permit.
- stormwater pipe sizes be a minimum of 15-inches unless impracticable.
- sediment and erosion control measures be implemented as specified by the York County Soil Conservation Service.

2.1.2 Zoning Ordinance

The Zoning Ordinance contains several requirements related to stormwater runoff in addition to the requirements in the Site Plan and Subdivision Regulations. A few examples are provided below:

- The Zoning Ordinance promotes cluster subdivisions to help protect the natural and cultural environmental which encouraging quality residential neighborhood designs.
- The Zoning Ordinance also has differing erosion and sediment control standards, road construction standards, parking area requirements, and general stormwater runoff standards for the various uses allowed in the Shoreland Overlay District (Article 8).

- The Watershed Protection Overlay District Requirements (Article 10) has different performance standards for stormwater runoff than the Site Plan and Subdivision Regulations, and the trigger for requiring a sediment and erosion control plan in this District (development of more than 5 acres of land) is more lenient than the Maine State trigger (disturbance of one or more acres of land).
- Article 18, Administration, describes the conditions under which the Code Enforcement Officers may issue permits, and under which the Planning Board will review development (under the Site Plan and Subdivision Regulations). Generally, commercial, office, industrial, public, semi-public, institutional, vehicular, recreation, amusement or miscellaneous use categories require review if there will be a building 5,000 square feet or larger, or if the use requires 25 or more parking spaces. Multi-family housing is also required to be reviewed, and any change which amends a prior approved plan needs to be reviewed and re-approved.

2.1.3 Other Stand Alone Ordinances

Finally, the Town has implemented a number of stand-alone ordinances or regulations throughout the years that also contain requirements for stormwater management on private development:

- The Town passed a requirement within their supplemental plumbing ordinance in 2009 that requires septic systems be pumped on a regular basis to promote proper functioning. This ordinance decreases septic system failures which could allow bacteria to be transported to water resources by stormwater runoff.
- The Town passed a Non-stormwater Discharge ordinance in November 2014 which prohibits the discharge of non-stormwater items into the municipal storm drain system. This ordinance was required by the MS4 General Permit.
- The Town passed a Post-Construction Stormwater Management Ordinance in November 2014 which requires that new developments maintain their stormwater infrastructure and certify to the town annually that they have completed inspections and any required maintenance. This ordinance was required by the MS4 General Permit.
- A public road acceptance ordinance specifies road width requirements (20 feet on each side of the centerline) and design requirements within the town.
- A Flood Plain Management ordinance requiring that development within the areas identified on the FEMA Flood Plain maps be reviewed prior to construction. Applications for a Flood Hazard Development permit are submitted to the Code Enforcement Officer for approval.

2.2 York Stormwater Infrastructure and Management

As of March, 2015, the Town of York stormwater infrastructure system consisted of approximately 1,000 catch basin and drain manhole structures, more than 20 miles of storm drain pipe, as well as a system of culverts and ditches associated with approximately 150 miles of public roads. In addition to this publicly maintained stormwater infrastructure, there is privately owned and maintained stormwater infrastructure associated with 16 miles of roads.

The following subsections describe how the Town of York implements its MS4 General Permit Requirements for Minimum Control Measures 1 through 5 (2.2.1), conducts maintenance and capital improvements related to Minimum Control Measure 6 for Pollution Prevention/Good Housekeeping (2.2.2), and how it has conducted several recent proactive efforts to minimize stormwater impacts on water quality (2.2.3).

2.2.1 York Implementation of MS4 General Permit Requirements 1 through 5

As have many other Phase II communities subject to MS4 General Permits, the Town of York has joined the communities of Berwick, South Berwick, Eliot and Kittery (who have been regulated since 2003) to implement some of the components of the permit cooperatively and to help minimize costs. This group of communities is self-named the York County MS4s. This regional York County MS4 group completes several of the General Permit requirements cooperatively within their own group, and collectively with the other 25 regulated communities. These regional and statewide efforts have become the norm across the nation for implementing these types of permits.

All 30 regulated communities must develop and implement a 5-year Stormwater Program Management Plan ("Plan") to coincide with the 5-year term of the Permit. This Plan describes how the towns will reduce or eliminate polluted stormwater runoff to the Maximum Extent Practicable within their Urbanized Areas, from their MS4 infrastructure by implementing six Minimum Control Measures. The York County MS4s developed a single plan for their whole group. The six Minimum Control Measures and a basic description of the kinds of things that need to be done is provided below:

1. Public education and outreach on stormwater impacts - The Public Education Minimum Control Measure is implemented jointly with the York County MS4s. The Lawns to Lobsters program is a key element of the program for York.
2. Public involvement and participation – This measure primarily requires that York involve the public where possible in implementing the overall permit requirements including things like, holding meetings that are open to the public, ensuring the program documents are available to the public, and holding at least one event each year that is related to implementing the Permit.



Figure 8 The Town promotes the good lawn care practices described in the Lawns to Lobsters program.

3. Illicit discharge detection and elimination - The Illicit Discharge Detection and Elimination measure requires the Town update their GIS to include unique identifiers for each outfall and catch basin, and that they keep the maps up to date. This measure also includes that outfall ditch and catch basins be inspected to identify potential sources of pollutants into the storm drain system. Documentation requirements for this measure are significant, and the GIS Manager and Stormwater Manager work cooperatively to ensure the documentation is conducted and accessible. An ordinance was also passed in November 2014 to comply with the Illicit Discharge Detection and Elimination measure: This ordinance prohibits non-stormwater discharges into the storm drain system.
4. Construction site stormwater runoff control - Additional construction inspections are required to be completed on development sites for sediment and erosion control. Code Officers will be training in the new procedures in the spring of 2015. Documentation for this measure is important and will be a focus of the training.
5. Post-construction stormwater management in new development and redevelopment - Another ordinance was passed in November 2014 requiring that private developments maintain their storm drain infrastructure, and certify to the town they have done so annually. A system of notifications is in place and cooperation between the Planner and Stormwater Manager is important to ensuring that this measure is implemented properly.

Implementation of this plan affects many departments and many of the ways the Town does business. The Stormwater Manager conducts primary oversight and management of the permit implementation.

The Town has developed an inventory of the storm water infrastructure system in their Geographic Information System (GIS) with hydrologic connectivity to show locations of the Town infrastructure, discharge points into resources (outfalls). The GIS Manager has developed applications that allow the Public Works Department personnel and Stormwater Manager to track inspections and maintenance of the system.

The Towns parcel layers are a component of the GIS, and the GIS Manager incorporates impervious cover acreage in each parcel dataset.

The GIS also contains drainage area boundaries for the 5 major rivers (York, Cape Neddick, Josias, Ogunquit, Great Works and the Coastal Streams), topography at 2-foot contours which is updated periodically using either high resolution aerial photography, or Light Detection and Ranging (LiDAR) remote sensing.

2.2.2 Maintenance and Capital Improvements (MS4 MCM 6)

The Public Works Department maintains the stormwater infrastructure in accordance with the requirements of MCM 6 Pollution Prevention/Good Housekeeping for the MS4 General Permit, and in accordance with the needs of the system. Overall, the following regular maintenance items are completed:

- Street sweeping of the beach areas daily from memorial day to labor day
- Street sweeping of other areas at least once each year as soon as possible after snow melt
- Catch basin cleaning annually, with particular attention to areas where basin might accumulate sand

- Preparations for storm events at the beach include securing areas from flooding, installing jersey barriers to break wave action.
- Annual ditch clean up in the spring

Inspections during each of the regular activities generally result in identification of unanticipated maintenance items which are prioritized by the Public Works Director and Public Works Foreman.

Capital projects are generally completed based on a 2006 Stormwater Management Plan, which has been adopted as part of the Comprehensive Plan. A review of the status of implementation of that plan follows.

2.2.2.1 Review of Stormwater Management Plan (Volumes 1, 2 and 3)

In 2006, under contract to the Public Works Department, Edwards & Kelcey completed a report providing a hydraulic analysis under varying precipitation conditions of 25 drainage areas in the Town. The report identified deficiencies in the existing stormwater conveyance system, and provided recommendations for corrective actions. The study area was confined to the area between the Maine Turnpike and the Atlantic Ocean (East and west boundaries), and the Cape Neddick and York Rivers (north and south). This report was adopted into the Town's Comprehensive Plan.

On March 18, 2015, the Public Works Director, Public Works Foreman, Planner, Stormwater Manager and consultants who authored the report met to review the recommendations and assess which elements have been completed and which are remaining to be completed. In addition, of the elements that are remaining to be completed, the attendees assessed which are still relevant and which may need to be adjusted. The following is a summary of the findings of the meeting.

Review of the design criteria used for the hydraulic analysis was compared to current design criteria in use for public works infrastructure projects. The following is a summary of the findings.

- Public Works infrastructure projects are designed using Maine DOT 1990 intensity, frequency and duration data for 100-year storm events (6.6 inches of precipitation in 24-hours, which has a 100% statistical frequency of occurrence over a 100 year time interval). This design criteria is currently applied to normal minor culverts, culverts on significant watercourses and for the beach discharge areas. During the study, recommendations were made to upgrade normal minor culverts based on a 25-year storm (5.4 inches of precipitation in 24-hours) and culverts on significant water courses based on a 50-year storm (5.8 inches of rain).
- In addition, public works infrastructure projects are designed based on spring tides (6.5 feet) plus 4 feet of storm surge, as was used in the evaluations for the study. Currently, the Town does not incorporate sea level rise considerations into its infrastructure project designs. The Comprehensive Plan includes a Town Action (6.4.2) to incorporate sea level rise into its infrastructure projects.
- The Federal Emergency Management Agency (FEMA) has been issuing new flood insurance maps since 2008 based on updated statistics. Updated maps for York will likely be issued in the next few years. The design parameter for infrastructure projects may need to be adjusted once the maps are issued.

The EK study recommended several major stormwater infrastructure projects to correct significant flooding issues. The following is a status of the completion of those projects:

- Barrell Lane system corrections (outfall undersized) – Completed
- York Street at south end of Long Sands Beach (outfalls undersized) – Completed
- Cape Neddick Airport Drive Extension project – Airport Drive project designed and constructed by private entity (not Town owned infrastructure). Airport Drive Extension portion is designed and has been funded, but easement issues are preventing construction.
- A table was provided listing major watercourse culverts that required upgrading. The Public Works Department continues to make good progress upgrading the culverts on the list as time and funds allow.
- Route 1 system from Turnpike to the ocean – Culvert across Route 1 near the Turnpike entrance was increased during DOT reconstruction of this intersection. Change corrected flooding issues in upstream areas and did not adversely affect downstream issues.
- Central Portion of Long Sands Beach – Concrete box culvert installed to mitigate tidal issue.
- Short Sands Beach/Briley Brook infrastructure – Completed 2012.
- North End of Long Sands Beach – Completed 2014.

Four of the major projects included costs for optional flood gate and pump/control systems, however these systems were not constructed due to cost considerations.

The EK study also recommended several non-structural changes to Town Policy and ordinances. The following is a status of the completion of those recommendations:

- The town should take selected wetlands (shown on Plan 2 of the EK report in Volume 2) into its conservation easement program including 100 feet back from high water or 2 feet above high water, whichever is greater. – This has not been implemented.
- Public easements should be acquired along all significant cross country storm drains, streams, and watercourses to allow Town right of access. – This is now being implemented with any infrastructure project.
- Maintenance of existing Town stormwater infrastructure is inadequate. – This is now being implemented and became a requirement of the MS4 General Permit in July 2013.
- Private development stormwater management for quality and quantity should be required for any subdivisions or developments over 2 acres, and for all commercial developments. – Treatment of stormwater quality and quantity is required at the state level for any new developments with one or more acres of impervious cover. In addition, the Comprehensive Plan has a Town Action (6.4.12) to modify ordinances to incorporate these recommendations.
- Maintenance should be required for any developments where the stormwater infrastructure remains private. – The Town passed the Post Construction Stormwater Ordinance in November 2014 which requires private developments maintain their infrastructure and certify annually to the town that they are maintaining it.
- Ordinances should be modified to prohibit construction of any building or major modification or enlargement of any building that is not located in an elevation 12 feet

MSL or higher. - The Comprehensive Plan has a Town Action related to this recommendation (6.4.1) to review ordinances and provisions for properties in tidal areas identified as vulnerable and enact amendments to protect the properties over time.

- Individual homes that are considered infill units must demonstrate compliance with the wetland setback and elevation restriction conditions. - The Comprehensive Plan has a Town Action related to this recommendation (6.4.1) to review ordinances and provisions for properties in tidal areas identified as vulnerable and enact amendments to protect the properties over time.
- All new culverts or culvert replacements either public or private should be a minimum of 15 inches in diameter. – This is being implemented wherever adequate soil cover can be provided.

2.2.3 Proactive Efforts to Reduce Impacts of Stormwater on Water Resources

The town has a good history of protecting its natural resources from adverse impacts of stormwater pollution. As is evidenced by a review of the Natural Resources Chapter of the Comprehensive Plan and several recent initiatives which are described in the following subsections.

2.2.3.1 Review of Natural Resources Chapter (11/5/2013)

For this Stormwater Chapter of the Comprehensive Plan the Natural Resources chapter was reviewed to assess the extent to which Natural resources in York are at risk because of development impacts, or stormwater impacts.

The inventory portion of this chapter describes that most of the surface geology is either glacial till or marine clay, both of which have low permeability and are a poor base for land development. The coastal and dune areas contain fine to medium sands (good permeability) up to 25 feet thick. No significant sand and gravel aquifers are present in York. Surface waters are identified as generally meet their state water quality classifications except for bacteria issues at the beaches and Cape Neddick River (this fact was confirmed by review of the Maine DEP impaired water list for 2012 – the latest list for which data is available).

Development-related pressures are identified as threats to the Town’s Natural Resources including:

- Groundwater pollution from development on poor soils without public sewer collection and treatment
- Non-point source water pollution from road maintenance and new development with inadequate erosion/sedimentation control
- Reduction in surface water quality from increasing impervious surfaces in each watershed.
- Loss of biodiversity by habitat loss and fragmentation from new roads and development
- Worsening of flooding problems from historic unplanned development and sea level rise

2.2.3.2 Cape Neddick River Watershed Management Plan and Implementation

The Town continued support of a local grass roots effort to correct the bacteria water quality impairments of the Cape Neddick River by the Cape Neddick River Association. The Cape Neddick River was identified by the Maine DEP as a Non-point Source Priority Watershed. The Town completed a Watershed Management Plan for the River which was approved by the Maine DEP in 2014 as an EPA nine element Plan and the watershed is therefore eligible for state funding to help correct the impairments.

The Town is working cooperatively with the Cape Neddick River Association to apply for state funding to implement components of the plan.

2.2.3.3 Historic efforts to open shellfishing areas along the York River

In 2007, the Town began cooperative efforts with the Department of Marine Resources to complete shoreline surveys along the York River. Mapping of septic systems along the river and proactive correction of failed systems were instrumental in re-opening for shell fishing previously closed sections of the River.

2.2.3.4 Recent efforts to designate the York River as Wild and Scenic

Since 2009, the Friends of the York River have been working to determine whether a National Wild and Scenic Partnership River designation would be an appropriate way to recognize, manage and protect the York River. The Town has been a supportive actively working partner in this effort. Recent progress includes completion of the York River Wild and Scenic River Study.

2.2.3.5 Municipal Green Buildings

Article Nine of the Zoning Ordinance contains requirements to construct municipal buildings to meet or exceed LEED Silver Certification (unless the building is less than 5,000 square feet or is used for storage only). The Leadership in Energy and Environmental Design (LEED) is a Green Building Council program which incorporates some good stormwater infrastructure design practices.

2.2.3.6 2014 Sustainable Water Workshop

In 2014, the Town convened a “Sustainable Water Workshop” inviting consultants and industry experts from universities, cooperative extensions, the Wells Reserve, Southern Maine Planning and Development Commission, and regulatory agencies to review the concept of a watershed based approach to regulating land use. Outcomes of the meeting, as documented by five staff who attended the workshop were segregated into short term, medium term and long term goals:

Short Term goals include: continued public education, benchmarking, adopting MS4 model codes, and researching stormwater utilities

Medium Term goals include: creation of a clean water utility or user fee or structure to ensure clean water and funding to complete what needs to get done, continued monitoring of water resources to provide a sound basis for action and policy

Long Term goals include: updating codes and ordinances, continued infrastructure maintenance and capital improvements, and enforcement against those violating ordinances that adversely impact water quality (e.g., failed septic systems).

2.2.3.7 Build out analysis

In 2001, the Town completed an analysis to assess what the impacts to land use and clean water would be once all buildable lots have been built upon in the ways that the zoning ordinances allow (Full build out completed). The analysis concluded that for York drainage areas that have access to the municipal sewer system, only a few are currently exceeding the 10% impervious cover criteria that most experts agree cause water quality issues because of runoff. This analysis was not completed for the areas that do not have access to municipal sewer. This analysis was completed before the GIS system began tracking impervious cover on a parcel-by parcel basis.

2.2.3.8 Sea Level Rise

The Town recently completed an inventory and analysis of the impacts of sea level rise on public and private infrastructure and developed a number of Town Actions related to improving regulations and changing infrastructure design policies and practices. Implementation of these actions in conjunction with changes to regulations for private development should be conducted concurrently.

2.2.3.9 Flooding standards

The Town requires that a 100-year storm be used whenever evaluating a site for flooding impacts.

2.2.3.10 Beach Monitoring and Investigations

The Town of York Recreation Department monitors the beach waters in accordance with the Maine Healthy Beaches Program to assess if the water is “swimmable”. Beach postings are made if water quality is unacceptable. The Town has also initiated investigations to identify the sources of pollution that are causing the beach postings. One of the programs included hiring UNH to conduct a modelling effort to identify when postings are occurring. This effort is ongoing and will assist in minimizing the postings.

2.2.3.11 York River Designation Efforts

Starting in 2009, the locally-based group Friends of the York River -- which includes residents, town leaders, and others interested in river conservation -- lead an exploratory effort to determine whether a National Wild and Scenic Partnership River[i] designation might be an appropriate way to recognize, manage, and protect the York River and its associated resources. With support from the York and Eliot Boards of Selectmen and Kittery Town Council, Representative Chellie Pingree (ME-1) asked the Northeast Region of the National Park Service to undertake a reconnaissance survey to evaluate the York River as a candidate for a potential Wild and Scenic River designation and as a step toward a full Wild and Scenic River Study. The National Park Service completed a reconnaissance survey in 2013 and concluded that the York River would be a good candidate for a Wild and Scenic Study. [ii]

In 2014, subsequent to a bill submitted by Senator Angus King (I-2), the US Congress approved an amendment of the Wild and Scenic Rivers Act “to designate segments of the York River and associated tributaries for study for potential inclusion in the National Wild and Scenic Rivers System.” [iii] At this point in time, only the study of the York River is being conducted. The congressionally authorized Wild and Scenic Study is intended to determine whether the York River is eligible and suitable for designation as a Partnership National Wild and Scenic River, and to determine if such a designation is appropriate for the communities of Eliot, Kittery, and York. The Study provides an opportunity for the towns to work together across their boundaries on a watershed scale to gather important information and identify issues and goals for this shared resource. The end result will be the publication of a York River Management and Stewardship Plan.

The York River Steering Committee, also known as the Friends of the York River is working with the Boards of Selectmen/Town Council in Eliot, Kittery, and York to appoint a York River Study Committee to oversee and manage the study process. It is anticipated that the Study Committee will be in place by August or September 2015. The Study Committee will be composed of local appointees and partner organizations to oversee the study of the York River, to share information among the communities and partners, and to ultimately publish and publicize the Management and Stewardship Plan. With input from the residents of the three communities, the Study Committee, together with the National Park Service, will ultimately determine whether or not a designation of the York River as a Partnership Wild and Scenic

River should be pursued. Both the study development process and the plan will be of great value, whether designation is or is not pursued.

2.3 York Finance Program for Stormwater Issues

The estimated value of the Town’s stormwater infrastructure, if it were all new and in excellent condition, is approximately \$7,740,000. Operation and Maintenance of the infrastructure is conducted generally through the Public Works Department using the general tax fund. The Public Works Department has had good luck historically funding capital projects through the receipt of federal grants, and through bonding.

Costs associated with regulating development in the Town are associated an enterprise fund which is funded using fees for services. This approach helps to pass the cost to the entity requiring Planning Board, Code Enforcement or GIS Department Services depending on the complexity of the services provided. These are typically one-time only fees for applications associated with various aspects of the Land Use Ordinance.

In the Fall of 2012, the Town participated in a two day workshop organized by the Southern Maine Planning and Development Commission to review the steps necessary to implement a stormwater user fee. The Public Works Director and Community Development Director attended the workshop in addition to attendees from five other Towns (Wells, Kittery, South Berwick, Berwick and Eliot). The consultants providing the technical information worked with each of the Towns to gain a cursory understanding of the community and ran rough estimates of the revenues that could be generated to provide necessary stormwater services. For the Town of York, the calculations showed that for a \$4/month per ERU fee, approximately \$500,000 would be available for stormwater services.

Rough Fee Estimate

	Berwick	Eliot	Kittery	S. Berwick	Wells	York
Population	7,246	6,204	9,490	7,220	9,589	12,854
Households	2,350	2,300	4,100	2,450	4,000	5,200
Area (sq mi)	37.6	21.3	21.0	35.0	58.2	54.9
Ind/Com Acres	1,167	1,058	655	760	655	2,457
Revenue/ \$1	\$100k	\$100k	\$125k	\$100k	\$125k	\$150k
\$4/mo fee	\$400k	\$400k	\$500k	\$400k	\$500k	\$600k
Current Expenditures	\$75K	\$75k	\$1.26MM	\$318k	\$275k	\$1.15MM

Figure 9 Summary of potential available funds from 2012 Stormwater User Fee Workshop

3 ANALYSIS

Clearly there are many ways to address regulation, management and financing of stormwater related activities. Over the years there have been significant changes in the ways that private development has been regulated and municipal stormwater infrastructure has been managed.

The Town of York has a good history of being proactive and protecting water resources rather than reactive to correct them as is exemplified by the fact that few waters within the Town boundaries are impaired from stormwater impacts. Those waters that are impaired or at risk of impairment (Beaches and Cape Neddick River) are being given good attention by the Town and local groups to identify sources of pollutants and remove them.

The following subsections provide a comparison of the Town of York stormwater regulations, management practices and financing strategies that were described in Section 2 with regional and national stormwater regulations, management practices and financing strategies described in Section 1.

3.1.1 Comparative Analysis for Private Development Sites

Generally, the Town's ordinances have multiple references to conflicting standards for sediment and erosion control for construction sites, for stormwater infrastructure design (including parking space and roadway design) as described in Chapter 2. The Town has recently embarked upon an effort to consolidate and coordinate the varying standalone ordinances (Site Plan and Subdivision regulations) with the Zoning ordinance. This effort will likely correct many of the inconsistencies, and will greatly simplify the process of determining how a site should be developed.

The Town also has plans to implement LID and green infrastructure requirements into their Zoning Ordinance (Town Action 5.6.3). During this effort, the Town's stormwater management standards will be adjusted to conform at a minimum to the state standards. This effort should result in good continued protection of water resources from adverse stormwater impacts.

The following is a listing of good practices that are being implemented by others that the Town of York is NOT currently implementing but may want to investigate in order to continue to promote wise stormwater management practices:

- Conservation Subdivision standards
- Watershed-specific models for developers to estimate post development impacts after BMPS have been installed.
- Community specific guidance documents for developers
- Town has not yet adopted the new Cornell intensity/duration/frequency precipitation data for use in evaluating flooding impacts.
- The Town has a supplemental pumping ordinance for septic systems, but needs stronger controls on septic systems to ensure they do not fail, and contribute bacteria to natural resources.

3.1.2 Comparative Analysis for Municipal Management of Infrastructure

The Town is implementing a number of proactive efforts to maintain their infrastructure so that it functions well and is protective of water quality. The Town does a good job of prioritizing and implementing capital projects in accordance with the 2006 Stormwater Management Plan.

They also are very proactive in their efforts to protect water quality through support of grass root efforts in the Cape Neddick Watershed and the York River area.

The GIS system is progressive and sophisticated compared to other communities of their size. In particular, embedding hydrologic connectivity into the GIS network and identifying drainage areas could help streamline watershed based regulations for private developments. The Comprehensive Plan has a Town Action (5.6.4) to evaluate impervious cover on a watershed basis, to ensure each watershed has less than 10% directly connected impervious cover.

The Comprehensive Plan has a Town Action (5.6.3) to modify ordinances to incorporate LID and water quality and quantity stormwater treatment standards.

The Comprehensive Plan has a Town Action (6.4.1) to review ordinances and provisions for properties (including infill units) in tidal areas identified as vulnerable and enact amendments to protect the properties over time.

The Town recently completed an inventory and analysis of the impacts of sea level rise on public and private infrastructure and developed a number of Town Actions related to improving regulations and changing infrastructure design policies and practices. Implementation of these actions in conjunction with changes to regulations for private development should be conducted concurrently.

The following is a listing of good practices that are being implemented by others that the Town of York is NOT currently implementing but may want to investigate in order to continue to promote wise stormwater management practices:

- Asset management for stormwater
- The town should consider requiring that wetlands which are important to flood control be placed into conservation (shown on Plan 2 of the EK report in Volume 2). The Town should consider including the area around the wetlands that are within a 100 foot back from the high water mark or that are 2 feet above high water, whichever is greater.

When the EPA issues new MS4 General Permits, the Town will likely need to implement the following items:

- Identification of catchment areas for each MS4 outfall, prioritization of those outfalls for illicit discharge potential and wet weather and dry weather sampling and analysis for each outfall.
- Written procedures for sediment and erosion control inspections at construction sites.
- Evaluation of municipal street design and parking standards to minimize stormwater impacts.
- Evaluation of municipal development regulations and adding in requirements for private developers to implement green infrastructure practices, where achievable.

- Evaluation and prioritization of municipal properties for their potential to be retrofitted with green infrastructure to reduce the adverse impacts of impervious surfaces. Implementation of the retrofits in accordance with the priority and a schedule.
- Development and implementation of watershed management plans to address water quality impairments whether or not a water has a TMDL document prepared.

3.1.3 Comparative Analysis of Financing Stormwater Infrastructure Management

The Town has had good success receiving grants for projects, and issues bonds when needed to implement capital projects. The town appears to have sufficient staff to accomplish the required maintenance and repairs and adequately protect the beach areas during storm events.

The following is a listing of good practices that are being implemented by others that the Town of York is NOT currently implementing but may want to investigate in order to continue to promote wise stormwater management practices:

Implementation of a stable funding mechanism for stormwater services

Overall, the Town is progressive with regards to stormwater management for development sites and for its own infrastructure management and funding. Implementation of additional practices will help to ensure protection of the Towns overall character, water resources and critical natural resources.

APPENDIX A
SUMMARY OF REFERENCES REVIEWED FOR STORMWATER CHAPTER OF COMPREHENSIVE PLAN
TOWN OF YORK, MAINE

Document or Site Name	Description	Potential applicability to York Maine
Comprehensive Plan Reviews		
Comprehensive Plans Reviewed (Maine)	<ul style="list-style-type: none"> • City of Portland (no dedicated stormwater chapter) • South Portland (no dedicated stormwater chapter) • Kittery (no dedicated stormwater chapter) • City of Bangor (stormwater is an element of natural resources chapter). 	<p>City has implemented a “Sustainable Portland” Initiative that includes energy conservation, reducing dependence on fossil fuels, reducing impacts on climate change, adapting to climate change, improving food systems, improving waste systems, implementing greenway system for non-vehicular travel, improving parks and open spaces, and implementing their Stormwater Service charge (which promotes implementation of green infrastructure and Low Impact Development).</p> <p>The City of South Portland has a Water Resources Department which includes operations of their wastewater treatment plant, sewer collection, stormwater collection, combined sewer overflow reduction, and roads maintenance and reconstruction.</p>
Comprehensive Plans Reviewed (Other States)	Portsmouth NH 2005 Master Plan (no dedicated stormwater chapter, but have goals to implement best practices for stormwater (FS-6).	Portsmouth implemented a sustainable Portsmouth initiative that includes energy conservation, reducing dependence on fossil fuels, reducing impacts on climate change, promoting construction of LEED certified buildings and implementing green infrastructure for stormwater management.
General Guidance Documents		

APPENDIX A
SUMMARY OF REFERENCES REVIEWED FOR STORMWATER CHAPTER OF COMPREHENSIVE PLAN
TOWN OF YORK, MAINE

Document or Site Name	Description	Potential applicability to York Maine
Forging the Link: Linking the Economic Benefits of Low Impact Development and Community Decisions http://unh.edu/unhsc/forgingthelink	An online course in the Benefits of LID in six (6) chapters: <ol style="list-style-type: none"> 1. Guiding Principles 2. Benefits of LID 3. Economics and LID 4. Historic and Projected Climate Change 5. LID as a Climate Change Tool 6. Overcoming Barriers to LID Implementation. 	Provides information on the benefits of LID and green infrastructure installation through examples. Focus is on the triple bottom line of economics, ecological benefits and building community resiliency (protecting infrastructure) to changing weather patterns. Contains good fairly local examples of LID that work and save developers money.
Maine NEMO Resources Guide for Land Use Planning (2005)	Provides a number of links and references to other documents.	Slightly dated, but reviewed and used to identify resources that were reviewed later in this table. (www.LID-stormwater.net ; City of Seattle, WA programs City of Portland Oregon, Natural Resources Defense Council; lowimpactdevelopment.org ; www.smartgrowth.org)
National LID Network (National NEMO) http://nemonet.uconn.edu/index.htm	Provides National LID Atlas, webinars for information.	General information on LID and specific examples of green infrastructure installation at sites across country.
Center for Watershed Protection	The Online Watershed Library (OWL) is a service provided by the Center for Watershed Protection that allows ready access to Center publications and other resources (research papers, tools, and stormwater manuals, among others) that support best practices in watershed and stormwater management.	General Information - Great place to start any search for information related to water protection OWL is a searchable, online database of basic information, stormwater and watershed manuals and plans, assessment tools, regulatory information, and other watershed-related resources.
State of the Practice (Regulation of Developments)		

APPENDIX A
SUMMARY OF REFERENCES REVIEWED FOR STORMWATER CHAPTER OF COMPREHENSIVE PLAN
TOWN OF YORK, MAINE

Document or Site Name	Description	Potential applicability to York Maine
<p>City of Portland, Oregon Stormwater Management Manual (2014) http://www.portlandoregon.gov/bes/64040</p>	<p>Provides policy and design requirements for stormwater management throughout the City of Portland, Oregon. The requirements in the manual apply to all development, redevelopment, and improvement projects within the City of Portland on private and public property and in the public right-of-way.</p> <p>Sites that develop or redevelop over 500 square feet of impervious surface are required to comply with infiltration and discharge requirements, volume control requirements, pollution reduction requirements, and operation and maintenance requirements.</p>	<p>Good example of the extent to which larger municipalities control development and stormwater infrastructure installation. In particular, this Manual places stringent requirements on stormwater design and allows reduced quality and quantity control only if circumstances prohibit installation of the higher standard.</p> <p>Technical detail provided is commensurate with Maine guidance on stormwater practices. Notably, the requirements apply to public infrastructure projects in addition to private requirements. The City has a stormwater user fee and manual also describes the credit system for the user fee.</p>
<p>Carroll County, Maryland Model Development (2007/2008) http://ccgovernment.carr.org/ccg/plan/builders.pdf</p>	<p>In 2007, a partnership of the Carroll County Government, the Alliance for the Chesapeake Bay, and the Center for Watershed Protection initiated a process known as Builders for the Bay to systematically examine Carroll County’s local codes and ordinances with an eye toward promoting more environmentally-sensitive and economically viable development. Resultant recommendations included changes to existing guidance documents and codes for: street and parking lot sizes, lot development, natural resource management (e.g., property tax</p>	<p>Good specific examples of codes and regulatory requirements that could be implemented in York.</p> <p>Their close alliance with the Center for Watershed Protection provides assurances that the standards they are developing are the most protective of water quality.</p>

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	incentive for restoration of stream buffers), stormwater management (vegetated open channels for road runoff, roof drain disconnection, parking lot runoff management, treatment requirements for new outfalls discharging to water resources).	
Greenville County, South Carolina – http://www.greenvillesc.gov/publicworks/Stormwater.aspx	County of Greenville contracted development of a Watershed based model for flood control in 2005/2006. The model was used for County projects and private developers to coordinate flood control on a watershed basis. The County developed their own Stormwater Management Design Manual (last updated in 2013) and an ordinance that requires its use. In addition to flooding control, the manual requires private developments to treat the first one inch of runoff from impervious surfaces for water quality and to detain that runoff for at least 48 hours. There are also additional requirements for sites that are developed wherever there are pre-existing water quality issues, and for sites that have been designated as Outstanding Resource waters.	Comprehensive design standards with regionally specific models to assess pollutant runoff concentrations. This type of program would be time consuming and costly to implement, but would be very protective of water quality and would be community specific.

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<p>Massachusetts Stormwater Management Manual http://www.mass.gov/eea/agencies/massdep/water/regulations/massachusetts-stormwater-handbook.html</p>	<p>In 2008, the State of Massachusetts made significant revisions to stormwater permitting requirements for private developments. The State then created a companion Manual providing practitioners with the technical information needed to implement the permit requirements. The new regulations and Manual require that developments use infiltration measures to eliminate loss of recharge to groundwater (pre to post development), implement LID where practicable, and treat 80% of the TSS from post development conditions.</p> <p>The document acknowledges that infiltration may be limited depending on soil conditions and specifies recharge requirements according to Natural Resources Conservation Services (NRCS) hydrologic soil groups.</p>	<p>Provides a schema for regulating stormwater in private developments for climate and soil conditions that are similar to Maine.</p>
<p>Virginia Runoff Reduction Method (RRM or VRRM) http://www.vwrrc.vt.edu/swc/Virginia%20Runoff%20Reduction%20Method.html Or http://www.vwrrc.vt.edu/swc/documents/CWP_TechMemo_VRRM_20080418</p>	<p>In 2008, the Virginia Department of Environmental Quality Developed as a way to promote better stormwater design and as a tool for use in compliance with Virginia Stormwater Management Program (VSMP) regulations, relies on a three-step compliance procedure:</p>	<p>This is a model that designers in Virginia could use to show innovative treatment trains meet the Virginia Stormwater Program Standards. The Virginia Program Standards only allow certain pre-approved stormwater technologies be used on development sites. This tool expands that list.</p>

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	<p>1. Apply site design practices to minimize impervious cover, grading, and loss of forest cover;</p> <p>2. Apply runoff reduction (RR) practices; and</p> <p>3. Compute pollutant removal (PR) by selected BMPs.</p> <p>By providing a mechanism to credit the volume reduction associated with these LID strategies the RRM also documents an allowable reduction of the overall size and footprint of structural detention practices, thereby providing an economic incentive for the development community to implement LID providing a better overall solution for minimizing the impact of development on the hydrologic cycle.</p> <p>Virginia DEQ updated the RRM in 2014. The method is accompanied by a spreadsheet for use with site planning and compliance. The spreadsheet is designed to help users plan combinations of stormwater BMPs for a particular site in order to meet VSMP regulations. There is a spreadsheet for new development, and a separate spreadsheet for redevelopment (prior developed lands).</p>	

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Protecting Water Resources and Managing Stormwater: A Bird's Eye View for New Hampshire Communities	March 2010. UNHSC, in partnership with the UNH Cooperative Extension, has produced a new guide focused on what local communities can do to protect water resources and manage stormwater runoff.	Very broad guidance to consider the range of strategies available to help protect water resources. It uses a bird's eye view to encourage community boards and municipal departments to consider a variety of options and use an integrated approach to water resource protection.
NH Innovative Land Use Planning Techniques A HANDBOOK FOR SUSTAINABLE DEVELOPMENT http://des.nh.gov/organization/divisions/water/wmb/report/innovative_land_use.htm	Recognizing the need for more comprehensive guidance on land use planning techniques, DES and the regional planning agencies decided to develop a handbook with model ordinances and guidance on innovative land use regulations authorized in state law.	Includes many techniques to preserve rural character, thriving downtowns, and a sustainable working landscape. New chapters available 2.9 Fluvial Erosion Hazard Area Zoning (added Sept. 2010) Complete Chapter / Ordinance Template Only 3.7 Neighborhood Heritage Districts (added Nov. 2014)
UNH Stormwater Center Biannual Report	http://www.unh.edu/unhsc/sites/unh.edu.unhsc/files/docs/UNHSC.2012Report.10.10.12.pdf	Design and performance of LID/BMPs in compatible climate conditions with York

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Minnesota Stormwater Manual http://www.pca.state.mn.us/index.php/water/water-types-and-programs/stormwater/stormwater-management/minnesota-s-stormwater-manual.html	Minnesota Stormwater Steering Committee. 2008. State of Minnesota Stormwater Manual: Version 2. Minnesota Pollution Control Agency, St. Paul, MN. BMP, development, lake, manual, stream, wetlands, design	This State stormwater design manual provides guidance on stormwater BMP practices that relate to cold climate issues that include high snowfall, springtime snowmelt, sensitive lakes, trout streams and sensitive wetlands. Stormwater management concepts include unified sizing criteria, special receiving water performance standards and stormwater credits.
Rhode Island Low Impact Development Site Planning Guide	This document was prepared in 2011 as a companion document to the Rhode Island Design Manual specifically to address a minimum standard for LID. The document describes techniques to maintain groundwater recharge and surface water discharge rates to predevelopment levels.	Document provides specific information on recommended roadway design, parking requirements, LID landscaping and Compact Development that could be applied to new York standards.
State of the Practice Municipal Stormwater Management (including Financing)		
City of Portland, Maine Stormwater Fee http://www.cleangrowthcleanwater.com/calculator	Clean Water equal Clean Growth City of Portland voted in January 2015 to implement a stormwater service charge to help off-set improvements to the CSO program (from a consent decree with EPA), and the MS4	Provides program to protect clean water – general tone of outreach components similar to that identified as a driver during the 2014 York Clean Water Workshop.

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	<p>program. City hired 5 employees to implement program. Billing to begin 1/2016.</p> <p>Effectively the fee is \$6/month/1200 sq ft. impervious cover (IC). Exemptions include: Properties less than 400 sq ft IC Long Creek sites</p> <p>Stormwater Credits are available through an application process. (up to 100% of fee if sites exceed quality and flooding control requirements).</p>	
City of Lewiston Stormwater Fee https://me-lewiston.civicplus.com/index.aspx?nid=199	Implemented in FT 2006/2007. The City charges \$50/year for mobile and single family homes (estimates that each has approx. 2,900 sq ft IC). Duplexes are charged \$74/year. Exemptions and credits are provided per a credit manual and process.	Fees were set rather haphazardly and may not fully cover cost of stormwater program. Lesson learned on preparing officials to talk to the press. The \$50 was an unplanned statement at a press event that became set in stone.
City of Bangor Stormwater Fee http://www.bangormaine.gov/content/2037/1885/1891/default.aspx	City council passed Ordinance 12-133 establishing a Stormwater Utility in May 2012. Rates are \$22/year/residential parcel (up to 3,000 sq ft parcel). Additional \$11/year/1,000 sq ft for larger parcels. Exemptions include: properties smaller than 500 sq ft.	Fees do not cover majority of the City's stormwater program, fees set very low to cover only additional expenses incurred by the MS4 program. This means there was no lowering of general taxes as the burden was shifted to stormwater producers. This also minimizes incentive for landowners to infiltrate to reduce stormwater runoff and fees (because fees are too low).

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City of Salem Oregon Stormwater Utility http://www.cityofsalem.net/stormwaterutility	Mike Gotterba spoke on this at a conference last summer Broken into three tiers with three scheduled increases plus a base charge, credits are available- Credit amounts vary from approximately 3 to 50 percent. Single-family residential ratepayers are not eligible for a rate credit. http://www.cityofsalem.net/Departments/PublicWorks/Operations/Customerservices/Pages/utility-rates.aspx	Mike Gotterba, Public Information Officer, at mgotterba@cityofsalem.net or 503-588-6211. Excellent example of the right way to start a stormwater utility – easy to talk to straight shooter than can field any question about a utility

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