PHASE II STORM WATER MANAGEMENT PLAN

CITY OF PROVIDENCE
PROVIDENCE, RHODE ISLAND

MARCH 2004

EXECUTIVE SUMMARY

The City of Providence currently implements many of the elements of a successful Storm Water Management Program. In order to fully comply with the RIPDES General Permit issued by RIDEM, the City must implement additional measures. The following table (also found in Appendix K) outlines those measures, identifies the responsible parties, measurable goals, and provides a schedule for implementation over the five year permit term. The listed measures were identified through several workshops conducted with the City's Storm Water Committee. Technical Memorandums (TMs) were prepared for each of the six minimum control measures. At these workshops the TMs were reviewed and implementation alternatives were discussed. Where possible, the measurable goals are identified as quantifiable measures. In other instances the measurable goals are presented as discrete activities. For these, the conduct of the activity is intended to serve as the goal.

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STORM WATER MANAGEMENT PROGRAM PLAN SUMMARY AND SCHEDULE
CITY OF PROVIDENCE
Providence, Rhode Island

This table identifies how the Plan complies with the General Permit (RIR040000) requirements for the six minimum best management practices. While this report identifies many alternatives, the items that the City has committed to are specified in this table.

Permit Reference	Minimum Control Measure Best Management Practice (BMP) Description	Potential Responsible Party/Department	Measurable Goal	Proposed Schedule	Comments
IV.G.1	Submit Annual Report to RIDEM	City Council	Annual Report completed	March 10 of every permit year (commencing 2005)	As discussed in Section 10.2 of the SWMPP. Annual Report Template included in Appendix L
1.	**Public Education and Outreach**				
IV.B.1.b.1 and 5	Distribute Storm Water Awareness Package (Neighbor to Neighbor)	Storm Water Committee, DPW	Materials complied. Information distributed. Number of packages distributed (distributed with Recycle Bins, copies at City Hall and Library).	Start distributing media by: 3/10/2005	As discussed in Section 3.4 of the SWMPP. Example educational materials for potential use included in Appendix A.
IV.B.1.b.1 and 5	Distribute storm water flyer to residents.	Storm Water Committee	Flyer distributed annually.	Media distributed by: 3/10/2005	As discussed in Section 3.0 of the SWMPP. Example educational materials for potential use included in Appendix A.
IV.B.1.b.1 and 5	Continue school programs and meet with local school officials annually to identify past activities and upcoming curriculum.	Storm Water Committee	Annual meeting.	Meeting held by January each permit year	Continue educational programs as discussed in Section 3.2 of the SWMPP.
IV.B.1.b.1 and 5	Make the Storm Water Management Plan available to the General Public	Storm Water Committee	Make plan available at City Hall and in schools. Consider putting the plan on the City's web site.	Make copy of SWMPP and NOI available in 2004	
IV.B.1.b.2	Develop strategies to inform public (visitors, employees, residents) on how to become involved in storm water program. Develop strategy for topics and media to be used.	Storm Water Committee	Strategy decided, information packaged for chosen media(s). Information distributed to the public.	Strategy developed by: 3/10/2005 and implemented in following years.	Opportunities are discussed in Section 3.2 of the SWMPP.
IV.B.1.b.2	Develop strategies to utilize partnerships with other governmental and non-governmental entities.	Storm Water Committee	Meeting(s) held with other community groups (governmental and non-governmental). Strategy developed.	Strategy developed by: 3/10/2005 and implemented in following years	Potential partners discussed in Section 3.2 of the SWMPP.
IV.B.1.b.3	Potential target audiences are described in Section 3.3.2 of the SWMPP.	Storm Water Committee	List developed.	Developed by: 3/10/2004 and reviewed annually	
IV.B.1.b.4	Potential target pollutant sources are discussed in Section 3.3.3 of the SWMPP.	Storm Water Committee	List developed.	Developed by 3/10/2004 and reviewed annually	
IV.B.1.b.7	Evaluate the success of this minimum measure.	City Council, Storm Water Committee	Annual Report completed	March 10 of every permit year (commencing 2005)	As discussed in Section 10.0 of the SWMPP.

Permit Reference	Minimum Control Measure Best Management Practice (BMP) Description	Potential Responsible Party/Department	Measurable Goal	Proposed Schedule	Comments
2.	**Public Participation**				
IV.B.2.b.1	SWMPP was developed by storm water committee that included DPW representatives. Plan was also made available to public comment and public noticed. A public meeting was held during the preparation of the SWMPP.	Storm Water Committee	SWMPP available for review	SWMPP available for review prior to submission to RIDEM	Copy of Public Notice for the public meeting is available from the DPW Director.
IV.B.2.b.2.i	Potential target audiences are described in Section 3.3.2 of the SWMPP.	Storm Water Committee	List developed.	Developed by: 3/10/2004 and reviewed annually.	
IV.B.2.b.2.ii	Include public involvement in the City's storm water program.	Storm Water Committee	Community groups contacted. Number of public activities.	Review annually	Section 4.2 includes current public involvement activities that exist within the City.
IV.B.2.b.2.ii	Develop local storm water committee to continue to develop and implement the Plan.	City Council	Committee developed and maintained.	Developed by 9/10/2004	
IV.B.2.b.2.ii	Conduct annual Storm Water Plan meeting for the public.	Storm Water Committee	Conduct annual meeting.	Meeting conducted prior to March of every permit year (commencing 2005).	
IV.B.2.b.2.ii	Develop storm drain stenciling program.	Storm Water Committee	Program developed, volunteers organized, basins stenciled.	Organize program by 2004 Begin stenciling by 2005	
IV.B.2.b.2.ii	Sponsor and support cleanup projects.	Storm Water Committee	Program developed, volunteers organized,	Organize program by 2004 Begin cleanups by 2005	
IV.B.2.b.2.iii	Provide adequate public notice prior to submitting the annual report. Allow the public to comment and review report.	City Council, Storm Water Committee	Annual Report made available at a specified community location. Public meeting held annually.	Meeting conducted prior to March of every permit year (commencing 2005).	
IV.B.2.b.2.iii	Provide a written summary of responses for all significant comments.	City Council, Storm Water Committee	Comments reviewed, written response made available to public (if necessary)	As needed	
IV.B.2.b.4	Evaluate the success of this minimum measure.	Storm Water Committee	Annual Report completed	March of every permit year (commencing 2005).	As discussed in Section 10.0 of the SWMPP.

Permit Reference	Minimum Control Measure Best Management Practice (BMP) Description	Potential Responsible Party/Department	Measurable Goal	Proposed Schedule	Comments
3	**Illicit Discharge Detection and Elimination**				
IV.B.3.b.1	Develop an outfall map including locations of all outfalls (GPS) and names of receiving waters.	DPW	Mapping completed, consider integration of asset management system. Identify names and locations of all receiving waters.	Developed by: 12/2006	As discussed in Section 5.2 and Section 5.4 of the SWMPP.
IV.B.3.b.2	Implement outfall tagging program to identify and number outfall pipes (optional if GIS mapping is available for all outfalls in MS4).	DPW	Number of outfalls tagged. Survey of outfalls completed. Number of outfall tags maintained (if installed).	Implemented by: 12/2006	As discussed in Section 3.4.1 and Section 5.4 of the SWMPP.
IV.B.3.b.3	Additional elements shall be recorded on an on-going basis. At a minimum, field notes will be made on municipal plat maps to plot the location of additional elements that will also be used to prepare outfall mapping. These additional elements will be recorded during maintenance of drainage structures, dry weather surveys and installation of new storm drains.	DPW	Procedures developed and implemented.	Procedures developed by 12/2006	Mapping discussed in Section 5.2 and Section 5.4 of the SWMPP.
IV.B.3.b.4	Develop and introduce an ordinance or other regulatory mechanism to effectively prohibit and enforce unauthorized non storm water discharges into the system. Section 5.3 and Section 5.4 of the SWMPP identifies alternatives for the City to accomplish this.	City Council	Draft language and legal review. Conduct informational meetings as necessary.	Developed and introduced by: 12/2004	As discussed in Section 5.3 of the SWMPP. Potential model ordinances are included in Appendix B and Appendix C.
IV.B.3.b.4	Adopt an ordinance or other regulatory mechanism to effectively prohibit and enforce unauthorized non storm water discharges into the system.	City Council	Submit and schedule for vote at City Council Meeting. Regulatory mechanism in place.	Adopted by: 12/2005	As discussed in Section 5.3 of the SWMPP. Potential model ordinance included in Appendix B and Appendix C.
IV.B.3.b.5.i.	Area that drains to the Moshassuck, West, Woonasquatucket, Seekonk, and Providence Rivers and Roger Williams Park Ponds will be first priority given the pathogen impairment for these waters.	DPW	Investigations identified, prioritized, conducted. Suspected illicit connections investigated. Source identified and scheduled for removal. Enforcement actions taken or referred to other entity such as police or RIDEM.	Program implemented by: 12/2007	As discussed in Section 5.4 of the SWMPP.
IV.B.3.b.5.ii	Complaints associated with illicit discharges will be directed to the DPW where these complaints will be logged. DPW will review these complaints upon receipt and determine the appropriate action to take.	DPW	Number of complaints logged and responded to.	Complaint procedures implemented by: 12/2006.	
IV.B.3.b.iii	Procedures for tracing sources of illicit discharges are detailed in Section 5.4.3of the SWMPP.	DPW	Number of illicit connections detected.	Procedures completed	

Permit Reference	Minimum Control Measure Best Management Practice (BMP) Description	Potential Responsible Party/Department	Measurable Goal	Proposed Schedule	Comments
IV.B.3.b.iv	The process for removing illicit discharges will be defined by the mechanism that will be used to prohibit and enforce illicit discharges.	DPW	Sources identified and removed.	Adopted by: 12/2005	The regulatory mechanism will define this process which must be approved as part of its adoption.
IV.B.3.b.v	The illicit discharge and detection program will be evaluated and assessed annually prior to the preparation of the Annual Report. This will consist of reviewing the areas evaluated, findings, whether changes in procedures and priorities need to be made. A summary of this evaluation will be included in the Annual Report.	DPW	Completion of annual review.	March of every permit year (commencing 2005).	
IV.B.3.b.5.vi	Inspect all catch basins in the City at least once. Maintain records of all inspections and corrective actions required and completed. This activity will be coordinated with the recording requirements as stipulated in IV.B.3.b.3 and cleaning activities required in IV.B.6. During these inspections, odors or flow and any other observations will be noted and reported for the purposes of determining whether illicit discharges should be investigated discharging to those structures.	DPW	Number of catch basins inspected. Records maintained. Number of corrective measures required and completed.	Inspections completed by: 12/2007	
IV.B.3.b.5.vii	Perform dry weather surveys in accordance with procedures established in Section 5.4 of the report. Perform a minimum of two surveys in accordance with standards stipulated in the General Permit.	DPW	Two sampling events completed.	Surveys completed by: 12/2007	
IV.B.3.b.7	If illicit discharges are detected from other physically interconnected MS4s, the City will report the finding to the owner of the illicit discharge.	DPW	Number of illicit discharges reported to other MS4 owners.	Process in place by: 12/2006	
IV.B.3.b.8	Unauthorized non-storm water discharges that are deemed appropriate to continue discharging to the storm drain system will be referred to the RIPDES program for appropriate action. Process will follow procedures developed by the RIPDES program for such a review.	DPW	Number of illicit discharges referred to RIDEM.	Process in place by: 12/2006.	
IV.B.3.b.9	Public education and municipal employee training programs will inform about hazards associated with illegal discharges and improper disposal of waste. Coordinate with Minimum Measure #1 and 6.	Storm Water Committee	Ensure that educational materials developed include illicit discharge awareness. Materials developed and distributed.	Materials selected, distribution commenced 12/2007	As discussed in Section 3.0 and Section 5.4 of the SWMPP.

Permit Reference	Minimum Control Measure Best Management Practice (BMP) Description	Potential Responsible Party/Department	Measurable Goal	Proposed Schedule	Comments
IV.B.3.b.10	All actions taken to detect and address illicit discharges will be recorded in both field notes as well as on outfall mapping prepared for IV.B.3.b.1.	DPW	Submittal of findings in Annual Report.	March of every permit year (commencing 2005).	
IV.B.3.b.12	Evaluate the success of this minimum measure.	City Council, Storm Water Committee	Annual Report completed	March of every permit year (commencing 2005)	As discussed in Section 10.0 of the SWMPP.

Permit Reference	Minimum Control Measure Best Management Practice (BMP) Description	Potential Responsible Party/Department	Measurable Goal	Proposed Schedule	Comments
4	**Construction Site Runoff Control**				
IV.B.4.b.1 and 3	Develop and introduce an ordinance or other regulatory mechanism to require sediment and erosion control and control of other wastes at construction sites. Section 6.3 and Section 6.4 of the SWMPP identifies alternatives for the City to accomplish this. The Rhode Island Soil Erosion and Sediment Control Handbook (as amended) will serve as the minimum standard.	City Council	Draft language and legal review. Conduct informational meetings as necessary.	Developed and introduced by: 12/2004	
IV.B.4.b.1	Adopt an ordinance or other regulatory mechanism to require sediment and erosion control and control of other wastes at construction sites.	City Council	Submit and schedule for vote at City Council Meeting. Regulatory mechanism in place.	Adopted by: 12/2005	As discussed in Section 6.3 of the SWMPP.
IV.B.4.b.2	Issue and track permits for all construction projects resulting in land disturbance of greater than 1 acre to ensure compliance with erosion and sediment control ordinance. Permit issuance procedures will be defined in the ordinance. Current tracking procedures will be reviewed and amended as necessary to comply with this program.	Building Official	Review current procedures. Improved procedure developed and implemented. Number of permits issued and tracked.	Developed by: 12/2005	As discussed in Section 6.2 and Section 6.3 of the SWMPP.
IV.B.4.b.4	Procedures for reviewing plans and SWPPPs for construction projects resulting in land disturbance of 1-5 acres, not reviewed by other State programs will be defined in the ordinance developed to comply with IV.B.4.b.1 and 2.	DPW, City Council, Storm Water Committee	Ordinance developed. Number of plans and SWPPPs reviewed.	Develop by: 12/2004 100% reviewed by: 12/2006	As discussed in Section 6.3 and Section 6.4 of the SWMPP
IV.B.4.b.5	Develop procedures for coordination of site plan and SWPPP review when relying on State program review of construction activity.	DPW, City Council, Storm Water Committee	Procedure developed.	Procedures implemented by: 12/2005	
IV.B.4.b.6	Public comment and information regarding new development projects and construction runoff related impacts will be directed to the Building Department where these complaints will be logged. The Building Department will review these complaints upon receipt and determine the appropriate action to take. Develop procedures for receipt and consideration of information submitted by the public.	Building Department	Procedure developed. Number of complaints logged and responded to.	Complaint procedures implemented by: 12/2006.	

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Permit Reference	Minimum Control Measure Best Management Practice (BMP) Description	Potential Responsible Party/Department	Measurable Goal	Proposed Schedule	Comments
IV.B.4.b.7	Procedures for site inspection and enforcement of erosion and sediment control measures and other measures for control of wastes at construction sites will be defined in the ordinance developed to comply with IV.B.4.b.1 and 2.	City Council	Review current procedures. Improved procedure developed and implemented.	Procedures implemented by: 12/2005	As discussed in Section 6.3 and Section 6.4 of the SWMPP. A sample of a contractor self-inspection report is included in Appendix D.
IV.B.4.b.7	Inspect 100% construction twice (1st during construction, 2nd after final stabilization)	Building Department	Staff trained. Number of construction sites inspect and number of occurrences per site.	Start: 12/2005	
IV.B.4.b.8	Develop procedures for referral to the State of non-compliant construction site operators.	DPW, City Council, Storm Water Committee	Procedure developed. Number of non-compliant construction sites referred to RIDEM.	Process in place by: 12/2005	
IV.B.4.b.10	Evaluate the success of this minimum measure.	City Council, Storm Water Committee	Annual Report completed	March 10th of every permit year (commencing 2005)	As discussed in Section 10.0 of the SWMPP.

Permit Reference	Minimum Control Measure Best Management Practice (BMP) Description	Potential Responsible Party/Department	Measurable Goal	Proposed Schedule	Comments
5	**Post-Construction Runoff Control**				
IV.B.5.b.1, 2 and 8	The City will rely on the State of Rhode Island Stormwater Design and Installation Manual (as amended) as a standard to address storm water runoff from new development and redevelopment projects. At this time, no additional modifications are proposed especially since the new manual is soon to be released by RIDEM.	City Planner	Program developed, priority areas specified.	Program in place by: 12/2005	As discussed in Section 7.0. A model watershed management plan is included in Appendix D.
IV.B.5.b.3	Procedures for pre-application meetings and site plan review (coordinate IV.B.4.b.4) will be developed as part of the development of new ordinances as described in IV.B.5.b.9.	City Planner	Procedures developed, number of pre-application meetings held.	Process in place by: 12/2005	
IV.B.5.b.4	Review 100% of plans and SWPPPs for development projects resulting in land disturbance greater than 1 acre, not reviewed by other State programs (coordinate with IV.B.4.b.4). Procedures will be developed as part of the development of new ordinances as described in IV.B.5.b.9.	City Planner	Number of plans and SWPPPs reviewed.	Start: 12/2005	
IV.B.5.b.5	Procedures for coordination of local and State post-construction storm water management reviews. Procedures will be developed as part of the development of new ordinances as described in IV.B.5.b.9.	DPW, City Council, Storm Water Committee	Procedures developed.	Process in place by: 12/2005	
IV.B.5.b.6	New industrial discharges proposed to discharge to discharge to the storm drain system will be referred to the RIPDES program for review and approval. Process will follow procedures developed by the RIPDES program for such a review.	DPW, City Council, Storm Water Committee	Number of activities referred to RIDEM.	Process in place by: 12/2005	
IV.B.5.b.7	When the City's Comprehensive Plan of Development is updated, opportunities for smart growth such as in-fill development, direct growth to identified areas, and protect sensitive areas will be identified. Additionally, non-structural BMPs as described in the State of Rhode Island Stormwater Design and Installation Manual (as amended) will be considered. Public education will include discussion of ways to limit runoff.	DPW, City Council, Storm Water Committee	Items developed and distributed.	Materials selected, distribution commenced by 12/2007	As discussed in Section 3.0 and Section 7.3.

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Permit Reference	Minimum Control Measure Best Management Practice (BMP) Description	Potential Responsible Party/Department	Measurable Goal	Proposed Schedule	Comments
IV.B.5.b.7 and 9	Develop and introduce an ordinance or other regulatory mechanism to address post construction runoff from new development and redevelopment projects. State standards will be included by reference. Section 7.3 and Section 7.4 of the SWMPP identifies alternatives for the City to accomplish this.	City Council	Draft language and legal review. Conduct informational meetings as necessary.	Developed and introduced by: 12/2004	As discussed in Section 7.2, Section 7.3, and Section 7.4. Model ordinance is included in Appendix F.
IV.B.5.b.9	Adopt an ordinance or other regulatory mechanism to address post construction runoff from new development and redevelopment projects.	City Council	Submit and schedule for vote at City Council Meeting. Regulatory mechanism in place.	Adopted by: 12/2005	As discussed in Section 7.2, Section 7.3, and Section 7.4.2. Model ordinance is included in Appendix F.
IV.B.5.b.10	Inspect 100% construction sites after final stabilization (coordinate with IV.B.4.b.7). Procedures will be developed as part of the development of new ordinances as described in IV.B.5.b.9.	Building Department	Number of construction sites inspected.	Start: 12/2005	As discussed in Section 7.3.
IV.B.5.b.11-12	Adopt by-law or regulations with language and enforceable mechanism for long term operation and maintenance of post-construction runoff controls. Include language will provide DPW authority to ensure proper operation and maintenance of all BMPs tributary to the storm sewer system. Procedures will be developed as part of the development of new ordinances as described in IV.B.5.b.9.	City Council	By-law or regulation developed. Submit and schedule for vote at City Council Meeting. Voted and adopted.	Adopted by: 12/2005	As discussed in Section 7.3 and Section 7.4. Suggested BMP operation and maintenance guidelines are included in Appendix H.
IV.B.5.b.14	Evaluate the success of this minimum measure.	Storm Water Committee	Annual Report completed	March of every permit year (commencing 2005)	As discussed in Section 10.0 of the SWMPP.

Permit Reference	Minimum Control Measure Best Management Practice (BMP) Description	Potential Responsible Party/Department	Measurable Goal	Proposed Schedule	Comments
6	**Pollution Prevention and Good Housekeeping in Municipal Operations**				
IV.B.6.b.1.i	Identify and list locations and description of all structural BMPs owned or operated by the MS4.	DPW	Number of structures identified.	Initial list: 3/2004 Update: March 10th of every year.	As discussed in Section 8.2.2 of the SWMPP.
IV.B.6.b.1.ii	Formalize procedures for inspections, cleaning and repair of detention/retention basins, storm sewers, and catch basins. The City is already conducting these tasks.	DPW	Identify the structures tributary to the system. Conduct a catch basin sediment accumulation pilot program. Establish a routine inspection and maintenance program. Maintain records of inspections conducted, number of structures cleaned, approximate volume of material collected.	Developed: 12/2005	As discussed in Section 8.7 of the SWMPP.
IV.B.6.b.1.iii	Formalize current catch basin inspection and cleaning program. All catch basins will be inspected annually and cleaned as necessary unless documentation supporting a different frequency of cleaning is submitted to RIDEM as part of the Annual Report.	DPW	Formalized existing program. Number of catch basins inspected and number cleaned.	Developed by: 12/2005 Annually commencing 12/2006	As discussed in Section 8.7 of the SWMPP.
IV.B.6.b.1.iv	DPW staff will observe road shoulders during road work projects. If erosion is observed, the crew will report it to its manager. DPW will then schedule repairs and appropriate methods for stabilization including riprap or vegetative stabilization.	DPW	Procedures implemented developed	Developed by: 12/2005	
IV.B.6.b.1.vi	Formalize current street and road sweeping program. City will continue to sweep all roads and streets once per year.	DPW	Maintain records of curb-miles swept, approximate volume of material collected.	Formalized by: 12/2006 Annually commencing 12/2006	As discussed in Section 8.7 of the SWMPP.
IV.B.6.b.1.vii	Develop program for controls to reduce floatables and other pollutants from the MS4. This program will be based on a review of current catch basin grates and their ability to bypass flows to a curb inlet, as well as observation of outfalls to determine locations with the greatest potential for floatables. A pilot program is proposed to evaluate the effectiveness of any floatable reduction strategy.	DPW	Program developed, volume of wastes collected and disposed.	Program developed by: 12/2005.	
IV.B.6.b.1.viii	City will continue to dispose of wastes removed from the MS4 in accordance with applicable State requirements.	DPW, Storm Water Committee	Waste disposed of properly.	Reviewed annually	As discussed in Section 8.7 of the SWMPP.

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IV.B.6.b.2	Operations under MS4s legal control that have the potential to introduce pollutants into the storm water system are addressed in Section 8.0.	DPW, Storm Water Committee		Completed by: 3/2004	
IV.B.6.b.3	Industrial facilities owned and operated by MS4s that have storm water discharges associated with industrial activities have been listed on the NOI.	DPW, Storm Water Committee	Facilities identified on NOI.	Completed by: 3/2004	
IV.B.6.b.4	Operation and maintenance and good housekeeping practices and BMPs for municipal operations have been identified in Section 8.0.	DPW, Storm Water Committee	Continue to implement	Implementation by: 3/2006	As discussed in Section 8.7 of the SWMPP.
IV.B.6.b.6	Incorporate storm water awareness training into existing training for equipment operators and mechanics (Heath & Safety, Right to Know)	DPW, City Council	Training completed. Educational materials distributed.	Procedures developed: 12/2006	As discussed in Section 8.7.
IV.B.6.b.7	Develop procedures to incorporate water quality improvements into flow management projects.	DPW, City Council	Procedures developed	Procedures developed: 12/2007	
IV.B.6.b.8	Develop procedures for implementing proper erosion and sediment and water quality controls for all construction projects undertaken by the City.	DPW, City Council	Procedures developed	Procedures developed: 12/2006	
IV.B.6.b.8	Include a list of planned capital improvements in the Annual Report.	DPW, City Council, Storm Water Committee	Meeting held to discuss municipality's needs. Improvements assessed and listed.	March of every permit year (commencing 2005)	
IV.B.6.b.10	Evaluate the success of this minimum measure.	City Council, Storm Water Committee	Annual Report completed	March of every permit year (commencing 2005)	As discussed in Section 10.0 of the SWMPP.

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1.0 INTRODUCTION

On December 8, 1999, the U.S. Environmental Protection Agency (USEPA) promulgated Phase II of its National Pollution Discharge Elimination System (NPDES) storm water regulations. Phase I of the USEPA storm water program established regulations for storm water discharges from municipal separate storm sewer systems (MS4s) in municipalities with populations of 100,000 or greater, construction activities disturbing five or more acres of land, and ten categories of industrial facilities. The City of Providence was not required to seek permit coverage under Phase I because the population served by the combined sewer system decreased the population served by the separate sewer system to below 100,000. The Phase II Final Rule expands the Phase I program by requiring smaller communities with MS4s in urbanized areas to implement programs and practices to control polluted storm Water runoff through the use of NPDES permits. Urbanized areas are based on the 2000 census.

The City of Providence is one of thirty-two Rhode Island municipalities located completely or partially in an Urbanized Area automatically designated under the Phase II program. In Rhode Island, Phase II regulated communities will be required to apply for a Rhode Island Pollutant Discharge Elimination System (RIPDES) permit which will be issued by Rhode Island Department of Environmental Management (RIDEM). These communities will be required to reduce the discharge of pollutants from their storm sewer systems to the "maximum extent practicable" to protect water quality.

As part of the permitting process, these regulated municipalities are required to prepare and submit Storm Water Management Plans that address how the regulated MS4 will comply with six minimum control measures. These six minimum measures include:

Public Education and Outreach
Public Participation/Involvement
Illicit Discharge Detection and Elimination
Construction Site Runoff Control
Post-Construction Runoff Control
Good Housekeeping/Pollution Prevention

Chapter 2 of this Plan provides a discussion of the water resources and land uses in the community as potential targets or prioritization of activities to address the six minimum control measures. Chapters 3 through 8 provide a discussion of the existing programs and practices for each of the minimum control measures. This includes a section of "Implementation Alternatives". These are modifications to existing programs or activities or additional measures which could be used to satisfy the permit requirements. Chapter 9 presents the selected alternatives for implementation. This includes a summary of the elements, responsible parties for implementation, as well as the measurable goals for each measure. This also includes a schedule for implementation. Chapter 10 provides standard permit requirements.

2.0 WATERSHED INVENTORY

2.1 Existing Water Resources

Four watersheds drain through Providence: the Pawtuxet, Woonasquatucket, Moshassuck, and Providence and Seekonk. A watershed is the area of land where all of the water that is under it or drains off of it migrates to a common location. A watershed generally includes lakes, rivers, estuaries, wetlands, streams, and the surrounding landscape. Groundwater recharge areas are also considered. Watersheds are nature's boundaries, which transcend political, social, and economic boundaries.

Because watersheds are defined by natural hydrology, they represent the most logical basis for managing water resources. A Watershed Protection Approach is, therefore, a viable strategy for effectively protecting and restoring aquatic ecosystems and protecting human health. Rhode Island supports this approach through the RI Watershed Partnership, which coordinates what have traditionally been separate government programs. Major features of a Watershed Protection Approach are: targeting priority problems, promoting a high level of stakeholder involvement, integrated solutions that make use of the expertise and authority of multiple agencies, and measuring success through monitoring and other data gathering. A watershed framework offers many opportunities to simplify and streamline the workload between involved parties, thus generating cost efficiencies. Each watershed presents unique opportunities and challenges. More importantly they present an opportunity for partnering with watershed advocates, academic institutions, industry, private landowners, neighboring communities, or state agencies to achieve mutual beneficial goals.

Significant water resources in the City of Providence include:

- The lower portion of the Woonasquatucket is densely populated. After its relocation as part of the Capitol Center Project in Providence, the lower portion of the Woonasquatucket River has experienced revitalization. The realignment of the Woonasquatucket River along its natural course forms the center of Waterplace Park and has transformed the Woonasquatucket River into a center for urban canoeists and kayakers.

- The Moshassuck River has been realigned with the Woonasquatucket and Providence Rivers for the creation of Waterplace Park.

- Traditionally, the Seekonk River served as a transportation route between Narragansett Bay and the industrial mills on the Blackstone. Today, it is home to the nation's oldest rowing club (the Narragansett Boat Club) as well as a growing amount of fish and wildlife.

It should be noted that other significant water resources exist in Providence as small, unnamed ponds, watercourses and wetlands. Some of these are isolated while others are located along stream lengths.

2.2 Impaired Waters

The Office of Water Resources of the Rhode Island Department of Environmental Management (RIDEM) has prepared a list of impaired waters in Rhode Island in compliance with section 303(d) of the federal Clean Water Act (CWA). These impaired waters are defined as those that do not meet State of Rhode Island Water Quality standards. RIDEM is required to develop Total maximum daily loads (TMDLs) for each of these waters. The purpose of the TMDLs is to identify the capacity of a surface water to assimilate pollutants without impacting its designated uses (e.g. fishable, swimmable) as well as meet the State Water Quality Standards. While many of the TMDLs are anticipated to focus on point sources of pollution, future TMDLs may require more intensive storm water controls to more aggressively reduce sources of storm water pollution from what was intended for the Phase II program.

The surface waters within Providence identified on the State's 303(d) list, issued November 21, 2000 and amended June 15, 2001, are: (1) Mashapaug Pond; (2) Roger Williams Park Ponds; (3) Moshassuck River; (4) West River; (5) Woonasquatucket River; (6) Seekonk River; and (7) Providence River. The cause(s) of the impairment, TMDL level of implementation, and the TMDL priority ranking for these waters are summarized in Table 2.1 and depicted in Figure 1-Impaired Waters.

TABLE 2.1
IMPAIRED WATERS

Waterbody Name (Identification #)	**Cause**	**Group** [a]
Mashapaug Pond (RI0006017L-06)	hypoxia, nutrients	Group 1
Roger Williams Park Ponds (RI0006017L-05)	pathogens, hypoxia, nutrients, excess algal growth	Group 2
Moshassuck River (RI0003008R-01B)	pathogens, TSS	Group 5
West River (RI0003008R-03B)	pathogens	Group 5
Woonasquatucket River (RI0002007R-10D)	Cd, Cu, Pb, biodiversity impacts, PCBs, Hg, dioxin, pathogens	Group 1, 2, 5
Seekonk River (RI0007019E-01)	hypoxia, nutrients, excess algal growth, pathogens	Group 1, 5
Providence River (RI0007020E-01B)	hypoxia, nutrients, metals, pathogens	Group 1, 3, 5

[a]
Group 1 Waters not meeting RI WQ standards and TMDL is currently under way
Group 2 Waters not meeting RI WQ standards and TMDL is planned for the future
Group 3 Changes in metals reporting criteria require additional sampling is required.
Group 4 Insufficient data and/or data is old. Further monitoring is required.
Group 5 TMDL or equivalent has been developed. WQ standards to be met within 2 years.

2.3 Wetlands

Approximately 93 acres of the City are classified as wetland areas. These wetlands cover approximately 1% of the City's land area depicted on Figure 2-Wetlands. The majority of the wetland areas are classified as "forested wetland: deciduous" or "scrub-shrub swamps." These wetland areas are generally located along river courses and ponds.

2.4 State Licensed Beaches

There is no state licensed bathing beach in the City of Providence.

2.5 Rare Species Habitat

It is important to note where storm water discharges are likely to impact habitats. According to available RIGIS data there is one area identified as a rare species habitat in the City of Providence in the vicinity of Rhode Island School of Design Figure 3-Natural Resources.

The rare or endangered species, location of sighting within the City of Providence, and their current Natural Heritage status are summarized in Table 2.2. Note: Identification of species locations is based on status as "currently extant"; i.e., observed within the last 20 years.

TABLE 2.2
RARE/ENDANGERED SPECIES

Species	**Location**	**Status** [a]
Peregrine Falcon (*Falco peregrinus*)	Rhode Island School of Design	SE Federally Threatened
Common Night Hawk (*Chordeiles minor*)	Rhode Island School of Design	C

[a] SE State Endangered
C Concern

2.6 American Heritage River

The Woonasquatucket River is one of 14 American Heritage Rivers. The American Heritage Rivers Initiative was created to advance the goals identified by the river communities. The Initiative has three objectives: natural resource and environmental protection, economic revitalization, and historic and cultural preservation. No new regulatory authority was created, or federal funds dedicated specifically to this initiative. Instead, existing federal and state authorities are focusing their resources and partnering with the communities to implement their goals. Some of the partners in the initiative are USEPA New England, US Fish and Wildlife, National Park Service, US Geological Survey, Rhode Island Department of Environmental

Management, the Woonasquatucket River Watershed Council and several communities to include the City of Providence.

The long-term goals of the initiative are to:

- Return the water quality of the river to fishable and swimmable by 2020.
- Create a contiguous Greenway and wildlife habitat along the length of the river.
- Identify and protect environmentally critical land parcels.
- Preserve and /or restore historically significant buildings and sites.
- Improve public access to the river and enhance opportunities for recreational activities.
- Support economic development opportunities and identify and promote positive growth patterns in the watershed.

2.7 Land Use

Land use directly affects the potential for storm water pollution and the types of pollutants found in storm water. Different land uses expose different pollutants to storm water. For example, residential land uses often result in higher nutrient (nitrogen and phosphorous) concentrations in runoff due to the use of fertilizers while metals concentrations are often higher in runoff from commercial areas due to traffic.

Based on RIGIS mapping, Providence consists almost entirely of high-density residential land uses. Large commercial and industrial developments also exist, including development along Route 95 and the Blackstone and Moshassuck Rivers. Given the location of the developed areas in Providence, in part along impaired waters in the city, there is significant potential for storm water quality impacts

In order to design an effective storm water management plan, it is essential to describe the land uses and percentages thereof, for the land uses in the city. Table 2.3 and Figure 4-Land Use identifies the land uses in Providence based on data available from RIGIS.

TABLE 2.3
LAND USE

Land Use	Acreage	Percent of Total Land
Brushland	37	0.3
Cemeteries	288	2.4
Commercial	1,396	11.6
Commercial/Industrial Mixed	180	1.5
Deciduous Forest	382	3.2
Developed Recreation	873	7.3
High Density Residential	4,787	39.8
Industrial	1,089	9
Institutional	1,067	8.9
Med. High Density Residential	349	2.9
Mines, Quarries, Gravel Pits	1	-
Mixed Evergreen Forest	14	0.1
Other Transportation	525	4.4
Railroads	71	0.6
Roads	488	4.1
Transitional Areas (urban open)	56	0.5
Vacant Land	14	0.1
Waste Disposal	16	0.1
Water	247	2.1
Wetlands	93	0.8
TOTAL	**5,661**	**100%**

High-risk land uses are those that have a higher potential risk or actual presence of pollutants such as sediment, metals, nutrients, and pathogens. The highest risk areas are those that contain a high percentage of impervious area, activities using dangerous chemicals, and high human activity thus creating a higher degree of human impacts (including automotive impacts). These areas would have industrial, commercial, commercial/industrial, transportation, quarries, and waste disposal land use designations. Industrial and commercial land uses can contribute solids and oils and grease from high volume parking areas. They may also contribute toxics and metals dependent upon the activities conducted at the site from areas associated with manufacturing and waste disposal. Transportation related land uses have the potential to degrade water quality from vehicular spills (oils, grease, antifreeze), salting and sanding, and particulate deposition. Higher concentration of metals can also be found due to tire wear, brake pads, and body wear.

Medium risk areas are those that contain a considerable amount of impervious area and human impacts (including pet waste impacts). These areas consist of high density and medium density land use designations. Residential land uses can be significant sources of nutrients and pathogens. Improper lawn care can contribute excess nutrients to the storm drainage system.

Sanitary systems that are not properly designed, constructed, or maintained can be significant sources of nutrients, pathogens, and organic contaminants. Residential land uses may be a source of toxic contaminants due to improper disposal of household hazardous wastes.

The agricultural lands are associated with fertilizer and pesticide runoff pollution. We have included in this group cemeteries, developed recreation (golf courses), and idle agriculture land uses.

Table 2.4 identifies the priority, higher risk, land uses in the City of Providence. Figure 5-Potential Target Areas depicts the proximity of higher risk land uses to critical or significant water resources such as wellhead protection areas and impaired waters within in the City of Providence.

TABLE 2.4
PRIORITY LAND USE

Land Use	Acreage	Percent of Total Land
High Risk:	1,869	33.0
Medium Risk:	2,834	50.1
Agriculture:	494	8.7
TOTAL	**5,661**	**91.8%**

3.0 PUBLIC EDUCATION AND OUTREACH

3.1 State and Federal Regulatory Requirements

The success of any storm water management program hinges on educating the public about the impacts of certain behaviors and practices on surface water quality in their watershed. In addition, public education will improve the City's ability to gain support to implement this program as well as secure required funding. For this reason, USEPA has included public education and outreach as a minimum control measure of the Phase II regulations. The requirements to satisfy this minimum control measure are:

1. Implement a public education and outreach program to distribute educational materials to the community or conduct equivalent outreach activities about the impacts of storm water discharges on local water bodies and the steps that can be taken to reduce storm water pollution; and

2. Determine the appropriate BMPs and measurable goals for this minimum control measure.

3.2 Available Resources

There are a number of resources and public education currently available or in-place to assist Providence to achieve the requirements of this minimum control measure. Examples of education and outreach materials are provided in Appendix A. The following is a list of the groups or programs that represent opportunities for education and outreach to the public.

3.2.1 School Programs

Providence schools have a required science curriculum in grades six through eight. The high schools share curricula for Physics, Biology, and Chemistry. To varying extents these curricula address environmental awareness and pollution prevention in accordance with the American Association for the Advancement of Science Project 2061 Benchmarks. These are national standards for science education. The following provides more information about environmental education or non-point source pollution education programs that are taught in Providence School District.

In Providence, teachers are encouraged to create connections between class content and real world applications. For environmental awareness and pollution prevention education this includes field trips to Central Landfill, Field's Point Wastewater Treatment Facility, and various river and bay boat tours. Students have also been involved with water sampling activities in connection with URI and other agencies as part of science fair project research. Many schools also offer Science Olympiad Teams and student research opportunities that incorporate environmental issues. To varying degrees, outside organizations have also brought presentations to the schools throughout the years. The Department of Transportation (DOT) has

presented civil engineering projects with their inherent environmental issues to many high school students.

The Providence School District provides a science newsletter called CATALYST. It is published at least quarterly and updates teachers on the numerous professional development opportunities available to them, science related activities, contests for students, and resource materials available in science education. Many Providence science teachers belong to organizations such as the Rhode Island Science Teachers Association, the National Science Teachers Association, the New England Association of Chemistry Teachers, the American Association of Biology Teachers, and the American Association of Physics Teachers. The organizations provide numerous professional development opportunities.

Available Teaching Resources

Teachers in the Providence school system have a number of resources and periodicals available to them that focus on environmental issues including water quality. Some of these resources are:

USEPA Environmental Education Center (EEC)
The on-line EEC provides teachers with technical background, curriculum and activities information, and workshops on a variety of environmental topics. This resource is useful in providing educators with the tools to teach students in grades K-12. The EEC web page is www.epa.gov/teachers/. More information on educational resources, including having USEPA employees provide talks and presentations at public events or in schools, may be obtained from the USEPA Region 1 (New England) office located at 1 Congress Street, Suite 1100, Boston, MA 02114-2023, (888) 372-7341.

The Environmental Education Grant Program was developed to provide financial support for projects that "design, demonstrate or disseminate environmental education practices, methods or techniques." Organizations eligible to apply for grant funds are:

- A local or tribal government education agency, college, or university; a state education or environmental agency; a 501(c)(3) not-for-profit organization; or a noncommercial educational broadcasting entity is eligible.
- A teacher's school district, an educator's not-for-profit organization, or a faculty member's college or university may apply, but an individual teacher is not eligible.
- The primary applicant must be based in the U.S.; partner organizations and project activities may be located outside the U.S.

USEPA Student Center
USEPA's Student Center web site provides information and activities for students to learn more about surface water ecosystems, environmental laws, and pollution. The site is located at www.epa.gov/students/. There is also the Explorers' Club web page for younger students with games, activities and documents on the basics of environmental education. The Explorers' Club is found at www.epa.gov/kids/.

President's Environmental Youth Awards
The President's Environmental Youth Awards is a program that recognizes young people across America for projects that demonstrate their commitment to the environment. Winners of regional certificates in the program are evaluated against winners in other USPEPA regions. The national winner receives a plaque issued by the President of the United States at an USEPA awards ceremony. Participants of completed projects will receive a certificate signed by the President. Projects can include a variety topics focused on environmental issues and environmental science. Participation in this awards program can be a mechanism to promote student interest in other education or participation programs.

Green Teacher
This magazine is produced by and for educators to enhance environmental and global education at all grade levels. It is produced four times per year and contains approximately fifty pages of ideas, activities, perspective articles, reports of what successful teachers, parents, and schools are doing, activities for various grade levels, evaluations of new books, kits, games and other resources. Green Teacher may be contacted at P.O. Box 452, Niagara Falls, NY 14304-0452, e-mail: greentea@web.net, (416) 960-1244.

EARTHWATCH
This magazine is produced bimonthly by the organization of the same name to link business, science, and the community in search of environmental solutions. Contact information: 680 Mt. Auburn Street, P.O. Box 403, Watertown, MA 02272, (800)776-0188.

Earth Preservers
Earth Preservers is an "environmental newspaper" for kids in grades 3-9 published monthly during the academic season. Contact information: P.O. Box 6, Westfield, NJ 07090.

EE-Link
EE-Link is an on-line environmental education resource guide that can assist educators in locating materials and information for class study guides, activities, and programs (http://www.eelink.net).

Blackstone Valley Rivers Project
The Blackstone Valley Rivers Project is a non-profit organization that is independent of the Woonsocket Education Department. It consists of three teachers from Woonsocket High School and two teachers from Mount Saint Charles Academy, also in Woonsocket. They run teacher workshops every summer showing teachers on how to incorporate river education into their science curriculums. Topics covered in the Blackstone River Studies course are taught at these workshops. In the last three years over sixty teachers have been trained. The Rivers Project follows-up with workshop participants and maintains a website that teachers can use as a resource for additional information. This program is provided outside of the Woonsocket Education Department. For more information please contact Mike Ferry at (401) 767-4703 or 4738 or view the Rivers Project website at http://www.siue.edu/OSME/river/.

Project WET

Project WET (Water Education for Teachers) is a national nonprofit water education program for educators and young people located on the campus of Montana State University. The goal of Project WET is to facilitate and promote the awareness, appreciation, knowledge and stewardship of water resources through the development and distribution of classroom ready teaching aids and through the establishment of Project WET programs. It is active in all 50 states, the District of Columbia, the U.S. islands and select provinces of Canada.

Certified Project WET facilitators conduct free workshops where educators, community leaders and natural resource managers receive instruction in the of Project WET materials. A workshop lasts six hours and participants receive the highly acclaimed Project WET Curriculum and Activity Guide. Workshop participants are then encouraged to integrate activities from the Guide into the existing school curriculum or other appropriate forums. This guide is a 500-page publication filled with over 90 innovative, interdisciplinary activities for grades K – 12, most of which are hands-on. Designed to coincide with state and national standards, the Guide addresses the following content areas:

- Water has unique physical and chemical characteristics.
- Water is essential for all life to exist.
- Water connects all Earth systems.
- Water is a natural resource.
- Water resources are managed.
- Water resources exist within social contexts.
- Water resources exist within cultural contexts.

Please contact the Audubon's Environmental Education Center, (401) 245-7500**,** or Christine Dudley of RIDEM, (401) 789-7481 and 0281, for more information about this program.

Healthy Water, Healthy People

Healthy Water, Healthy People is an innovative water quality education program sponsored by Project WET and the Hach Scientific Foundation, which offers hands-on activity guides, testing kits, and training. Healthy Water, Healthy People is for anyone interested in learning and teaching about contemporary water quality education topics. The goal of the program is to raise the awareness and understanding of water quality topics and issues and their relationship to personal, public, and environmental health. The program attempts to provide a clear understanding of these relationships, the connection between water quality and land uses, and the process of analyzing and interpreting data. Healthy Water, Healthy People will help educators address science standards through interactive activities that interpret water quality concepts and promote diverse learning styles, with foundations in the scientific method.

The program comes with educator guides for the fourth grade through university level age students as well as testing kits and manuals. The Healthy Water, Healthy People Testing Kits yield in-depth information about eleven water quality parameters. The water quality testing kits include all materials and equipment needed for field and classroom analysis of water samples

for chemical, physical, and biological parameters. Healthy Water, Healthy People Testing Kits are available for a variety of parameters, grade levels, skills, and prices.

For more information about the Healthy Water, Healthy People program visit their website at www.healthywater.org.

Active Watershed Education (AWEsome!) Program

The Southern Rhode Island Conservation District (SRICD) can provide the AWEsome! Program to any school system in Rhode Island. This program can easily be altered for different types of watersheds. The program is offered to teachers for a fee of $45. This curriculum includes discussion of the following applicable topics:

- **"What is a Watershed?"** demonstrates how water enters and flows through a watershed. Students learn how to read topographic maps and delineate watershed boundaries, and locate locations of interest (i.e., home, school, etc.). They follow the course of a raindrop from its point of impact on the watershed to the exit point as it flows into the ocean.
- **"Water Resources"** demonstrates the importance of ground and surface water. Experiments illustrate how an aquifer supplies water to wells and reservoirs. The session also emphasizes the interconnection between wetlands, groundwater, and surface water.
- **"Effects of Land on the Watershed"** s discussion and demonstrations to illustrate how different land uses impact the watershed. Through the use of a model, students see how infiltration and runoff of rainwater are affected by three different land s: pavement, row crops and pasture.
- **"Cultural Resources in the Watershed"** introduces the students to the history of the watershed and how land in the watershed has changed through time. Visitors from local Indian tribes and historical societies provide the students with different perspectives of how human presence has influenced the landscape, and how water resources have influenced human activities.
- **"Introduction To Water Quality Issues"** s a current development proposal that could adversely impact the watershed to introduce students to environmental issues. Students are assigned to one of many interest groups supporting various sides of the issue. Students are responsible for contacting their assigned interest group to explore all perspectives of the proposal and its impact on the watershed.
- **"Non-point Sources of Pollution"** defines and identifies major sources of non-point source pollution in the watershed. A discussion of best management practices (BMP's) to control non-point source pollution is followed by a field trip to local farms and shopping areas where BMP's have been implemented.
- **"Farms In The Watershed: A Field Trip"** demonstrates best management practices to minimize non-point source pollution from farms. Students are taken to a variety of farms, including dairy, poultry, turf, and organic vegetable operations.

SRICD is located at 60 Quaker Lane, Suite 46, Warwick, RI, 02886-0114 and has a website at http://ri.nacdnet.org/sricd_web/index.htm. For more information on AWEsome! and other SRICD educational programs contact Susan Letendre, Education and Outreach, at (401) 822-

8832 or via email at susan@sricd.org. Board Meetings are the 2nd Monday of the month at 6:30 PM and are open to the public.

Catch the Science Bug

Catch the Science Bug was created by Kim Bent as a traveling science program, bringing hands-on science activities to Boston-area elementary schools. Its mission is to excite and educate students about science and how it affects everyday aspects of life. Their Traveling Programs feature interactive inquiry-based methods of presentation to enable students to take part in the learning process. Students learn by predicting outcomes, observing, comparing, experimenting and drawing conclusions through hands-on activities. Appropriate math concepts are also integrated. All programs are designed in accordance with the National Science Standards, the Massachusetts Science and Technology Curriculum Frameworks, and the Benchmarks on the Way to Environmental Literacy.

Catch The Science Bug offers five programs, which range across a variety of science topics. These programs are also available to youth organizations such as scouting troops and church groups. Environmental Programs include:

- "**Clean-Up an Oil Spill**" This is a two hour program that challenges students to design the cleanup of a hypothetical oil spill.
- "**All Eyes on Earth**" combines four different programs including catch the recycling bug, where do you get your drinking water from, protecting our land and water resources, and contaminant hydrogeology.
- "**Watersheds**" addresses several topics directly related to storm water pollution prevention. Students learn how to define a watershed using a topographic map and are given different cards describing everyday activities that take place in a watershed. Participants then model the everyday activities, which show how land-use affects water quality.
- **"Protecting our Land and Water Resources"** includes explanation of non-point source pollution and storm water.
- **"Where Do You Get Your Drinking Water"** addressed pollution prevention and preserving surface water supplies through the use of a model. The model shows different non-point sources of pollution and shows how these sources affect both the ground water and surface water supplies.

Catch the Science Bug will soon offer a children's show to be televised over the Web at FreeNetTV. The show will feature a different science expert each week and will allow time for Kim to respond to questions that children send by e-mail while the show is "on the air." More information about available education programs can be found at www.catchthesciencebug.com and by contacting 508-854-1681 or sciencebug@charter.net.

Urban Ecology Institute (UEI)

The Urban Ecology Institute (UEI), established in 1998, studies the new field of urban ecology to help urban residents and policymakers understand the natural resources in their communities and to take action to protect them. The institute's members include scientists, educators, and

lawyers who research urban ecosystems. One of UEI's goals is to inform and empower people to improve their health, economy, and quality of life as well as natural resources.

UEI conduct the first inventory of all the natural resources found in the urban ecosystem and the most critical threats facing those resources. The UEI is also helping urban residents and policymakers develop realistic plans to protect threatened ecosystems and turn polluted and abandoned lands into able open spaces. One of their missions is to improve high school science education in urban schools by getting students out of the classroom to learn first-hand about the ecosystems around them and their connections to the environment. These connections made will help the students to realize that they can make a difference in their environment.

The UEI currently works with 28 teachers and over 600 students in 20 public schools in the Boston area with the desire to expand their program into other urban areas, including parts of Rhode Island. They serve as a catalyst for innovation and science education by providing training and ongoing consulting support to public school teachers. The curriculum units are intended to help students measure and understand ecological processes that can be indicators of ecosystem health. Part of this curriculum includes an annual student congress, in which students report on their findings to their peers and community groups. Although this program is current only in the Boston area, other urban areas are in communication with the UEI to acquire their program. The materials drafted for this educational program are applicable to any higher density area and may be available to communities outside of UEI's current scope.

The UEI is located at Boston College, 225 Higgins Hall, Chestnut Hill, MA 02467, (617) 552-0592. Charlie Lord can be contacted for additional information about UEI's educational programs at lordca@bc.edu or by calling (617) 552-0928.

3.2.2 Citizen's Groups

Several organizations exist that either currently provide public education resources on storm water quality issues or could provide a public outreach avenue in developing storm water awareness and developing partnerships with the public. The organizations that have the best potential to support future storm water education programs in Providence are the following:

Save the Bay

Save the Bay (STB) is a non-profit organization that advocates for laws and policies to protect Narragansett Bay, provides public education and outreach programs, sponsors Bay cleanup projects, coordinates the efforts of volunteers, interns, and staff to protect and restore the environmental quality of Narragansett Bay and its watershed.

STB provides outreach programs for a fee that include on-site presentations that use models, puppet shows, and hands-on activities for children and adults to learn about marine habitats, wildlife, and the effects of pollution. For example, their watershed model demonstrates how what we do affects a watershed on a personal and industrial level. The charge for these programs is under $100 for up to 30 people with reduced fees for subsequent presentations.

STB also offers field trips and uses its educational program vessel, a motor-powered 45-foot boat, to introduce children and families to Narragansett Bay. The program enables participants to haul in a net full of marine life, get a microscopic look at plankton, test water quality, learn about navigation, and discover how human activities impact Narragansett Bay. Half-day study cruises range from $375-$425 depending on the season while full-day study cruises range from $425-$525 for grades 4 – Adult. STB offers this program to grades three through twelve, while special arrangements are recommended for younger students. Programs are designed to meet specific Rhode Island Science Standards for separate grade levels.

STB also offers a Storm Drain Marking Project to schools and scout/youth groups. This project involves students in storm drain mapping, cleaning the areas around catch basins, placing "Don't Dump, Drains to River" markers on the catch basins, and handing out informational pamphlets to the homes within the project area. Students learn about preventing storm water pollution and educate the local community about illicit discharges. STB will provide materials and help coordinate Storm Drain Marking Projects.

STB's Education Center/Headquarters are located at 434 Smith Street, Providence, RI 02908, (401) 272-3540, www.savebay.org.

Audubon Society of Rhode Island

Since 1897, the Audubon Society of Rhode Island (ASRI) has maintained and cherished a century-long tradition of excellence in environmental advocacy, education and conservation. Due to ASRI's efforts, thousands of acres of state land are secure as wildlife refuges and thousands of children benefit from educational programs and nature camps. As environmental problems do not discriminate, the policies and programs of ASRI seek to better the environmental health of Rhode Island and all of its inhabitants by reaching out to children, concerned citizens, and the government. The ASRI has partnerships with the RI Conservation Districts, RIDEM, USEPA, Woonasquatucket Watershed Council, Water Use Stakeholders Group, Wood-Pawcatuck Watershed Association, Environmental Council, Sierra Club and Clean Water Action.

The ASRI offers many programs at various locations throughout the state. These programs can be adapted to meet the needs of any age group. From 1997-2000, 20,000 RI students participated and in 2001 alone this number increased to 23,000 students. A few of the applicable student programs offered are:

- "**Bay Animals Like It Clean and Salty**" which focuses on the Narragansett Bay and how pollution affects the plants and animals that live in it,
- "**Watershed Walks**" where students will learn the basics about a watershed and of the importance of water. This program includes that sampling of a watershed,
- "**Everything's Connected**" investigates the connections between all living things. The students learn how the earth recycles and our connection to the earth's health.

The ASRI education staff also offers teacher workshops on various natural science topics. "Project WET, Water Education for Teachers" is a nationally acclaimed workshop, presented by Christine Dudley of RIDEM, which offers teachers and educators free curriculum on ecology, habitats, and environmental issues.

The ASRI with the national Oceanic and Atmospheric Administration (NOAA) and RIDEM also offers education programs through the Narragansett Bay National Estuarine Research Reserve (NBNERR).

The Audubon's Environmental Education Center is located at 1401 Hope Street, Bristol, RI 02809, (401) 245-7500, and their headquarters are located at 12 Sanderson Road, Smithfield, RI 02917, (401) 949-5454, www.asri.org.

Woonasquatucket River Watershed Council

The Woonasquatucket River Watershed Council (WRWC) was formed as part of a successful effort to have the Woonasquatucket River designated one of the American Heritage Rivers. The council focuses on the river's historic, cultural, economical, and environmental significance. WRWC has helped to implement USEPA's and RIDEM's Watershed Approach model and makes a continuous effort to revitalize the river with the six communities in its watershed. WRWC works closely with local partners businesses, non-profit organizations, and state and federal agencies to advance local goals.

WRWC can provide educational mapping about the Woonasquatucket River Watershed. They assist STB with their Storm Drain Marking Program and will be working closely with the Narragansett Bay Commission (NBC) on a classroom education project. WRWC and NBC will visit 4th and 5th grade classrooms in all six communities of the watershed, including Providence. The project will provide a tour of the watershed, discuss run-off through the use of a watershed model, and will train teachers on how to run tests as part of student sampling activities.

WRWC is located in the Monohasset Mill Bldg., 532 Kinsley Avenue, Providence, RI 02909, (401) 861-9046, www.woonasquatucket.org.

Friends of the Moshassuck

The Friends of the Moshassuck was formed to be an advocate for the river through clean-up efforts and making it more accessible to residents and visitors. They consist of a board and directors and people who live in the neighborhoods along the river and are in the process of becoming a non-profit corporation. Many of their recent efforts and projects are outlined in Section 4.0 (Public Participation/Involvement). The Friends of the Moshassuck have an informational flier about the river that they distribute. Greg Garritt can be contacted at (401) 331-0529 for more information about this organization.

Moshassuck River Monitors

The Moshassuck River Monitors was formed as a joint effort between Moses Brown and Wheeler School to have students perform regular water quality testing of the Moshassuck River and nearby storm drain discharges. Students conducted four-season monitoring of the river, assessed land use, and performed nutrient loading analysis. They also sampled catch basins and outfalls during storm events to examine wet weather and CSO effects. Recently, this group has not performed as much monitoring; however, they took part in the National Monitoring Event (October 18th). Rob Brown at (401) 421-8100 or the Wheeler School at (401) 528-2317 can be contacted for more information about the Moshassuck River Monitors.

Blackstone Valley Tourism Council

The Blackstone Valley Tourism Council (BVTC) is the state designated regional tourism development agency for the Northern Rhode Island Tourism District. It is a non-profit corporation and registered as an educational organization. Since its beginning, BVTC has worked to develop, promote and expand the economic and community development base for the cities and towns in Rhode Island's Blackstone River Valley, while improving the region's quality of life, environment, and historic preservation. The Blackstone River Watershed Council is the division of the BVTC that focuses on the environment. Because of the region's strong ethnic cultural diversity and ecological importance to Rhode Island and New England, the Blackstone River Watershed Council offers exciting and exceptional interpretive services to educators and others. Environmental studies include hands on testing of water quality and learning about the interaction of nature and wildlife. BVTC owns and operates two US Coast Guard certified passenger river vessels offering seasonal American Heritage River Tours of the Blackstone River in Rhode Island. The riverboats serve as "floating tour coach" along the Blackstone River and have been facilitating interpretive ecology tours since 1994. Part of the tour focuses on how storm water run-off can impact the river. Tammy Gilpatrick at (401) 724-2200 can be contacted for more information about education programs provided by the Blackstone River Watershed Council.

Blackstone River Valley National Heritage Corridor

The U.S. Congress established the Blackstone River Valley National Heritage Corridor (BRVNHC) in 1986 to recognize the region's special place in American History. Located between Worcester, Massachusetts and Providence, RI, BRVNHC stretches for 46 miles along the full course of the Blackstone River and is an affiliated area of the National Park System. A unifying commission works in partnership with individuals, businesses, organizations, numerous local and two state governments, and the National Park Service to protect the Valley.

BRVHNC supports several Ranger Environmental Education Programs to schools throughout the Blackstone River Watershed. These programs educate students of all ages about storm water run-off, how our activities impact a watershed, and how to evaluate the health of a river. BRVNHC has yet to visit any Providence schools but would be interested in initiating programs in its school system.

- **Water Quality Program---A** has two tiers and this program focuses on non-point source pollution in general. The first tier uses an interactive program with a visual/3-D watershed model (Enviroscape) to help students visualize sources of pollution and the impacts of polluted flows. The second tier involves non-point source pollution posters and plays. Younger students will make posters and participate in plays, while older students also make posters and learn the plays so they can present them to younger students in their school.

- **Water Quality Program---B** has four tiers and this program is best for middle and high-school students since it requires the use of some sophisticated scientific instruments (Colorimeters and Spectrophotometers). The first tier uses the Enviroscape to explain watersheds. The second tier introduces the students to the equipment and appropriate water quality testing methods. At this stage, the Ranger handles all of the chemicals and instruments. During the third tier students collect water samples near their school (prior to the Ranger's arrival). The Ranger then helps the students perform the appropriate water quality tests. For the final tier, the students create a map using MapTek (a computer program) to illustrate areas of concern. They also try to develop a plan to inform others about the pollution problem and may present results to the town/city.

- **Bugs of the Blackstone Program** has three tiers and can be geared towards both older and younger students. The first tier provides an introduction to benthic macroinvertebrates (bugs that live on the bottom of the Blackstone River) and how the absence/presence of these bugs can indicate the health of a river. Younger students will create Bugs of the Blackstone using gumdrops and toothpicks, while older students will learn about the Macros by closely examining preserved specimens. The second and thirds tiers are optional and if students are interested, the Ranger brings live macros into the classroom. Students try to identify these macros (and depending upon their age, they are introduced to the Biotic Index Chart). The third tier is recommended for older students (8^{th} graders and above) and requires more time. The Ranger takes the students out on a field trip to a riffle pool where the students collect macros on their own. Then they try to identify the macros and determine the health of that river section using the Biotic Index Chart.

Karen Mateleska coordinates the above programs and can be contacted at (401) 762-0250. BRVNHC education staff has recently become short-staffed which will require them to indefinitely cut back on the number of environmental programs they can offer. The bugs of the Blackstone and tier 1 of both water quality programs will still be provided. If teachers are interested in the following tiers, BRVNHC can assist them with these programs. However, they are looking to help teachers develop more on-going watershed and water quality education through these tiers rather than providing the schools with one-day presentations. BRVNHC will also continue to support school and local efforts to conduct water quality sampling throughout the Blackstone River watershed.

New England Wild Flower Society

The New England Wild Flower Society (NEWFS) is the oldest plant conservation organization in the United States, promoting the conservation of temperate North American plants through key programs: Conservation, Education, Research, Horticulture. They do not focus their efforts on any one watershed or town, but are an available resource for New England towns. NEWFS's offers many education programs that are informative to both children and adults. There were 2,000 people register for their fall session. A total of four sessions are offered each year. A portion of their education programs cover wetlands and courses include "Wetland Identification and Delineation," "Wetland Species", and "Vernal Pool Ecology." The Rhode Island Chapter, known as the "Rhode Island Wild Plant Society" is coordinated by Erin Fournier at P.O. Box 114 Peace Dale, RI 02883-0114, (401) 783-5895 (phone), (401) 789-6056 (fax), office@riwps.org. Their website is located at www.riwps.org.

3.2.3 Regional, State and National Resources

There are a number of educational resources available for homeowners and businesses such as storm water guidance documents, programs for children, and educator training workshops. Many of the education and outreach materials developed can, in many cases, eliminate the need for Providence to develop its own materials. Some of the available resources are listed below.

U.S. Environmental Protection Agency

The Office of Wastewater Management (OWM) provides technical resources to persons responsible for designing and implementing BMPs recommended to achieve the goals of the six minimum control measures. These resources are available electronically at USEPA web sites. While the resources provide some background to the development of the Phase II regulations, they are largely oriented to municipalities and organizations that are developing storm water management plans as opposed to the general public.

The Office of Water has created "Adopt Your Watershed", a campaign to encourage citizens and groups to work at protecting and restoring surface and groundwater quality (www.epa.gov/adopt/). The program provides a resource for communities or groups to network with other groups nationwide. This networking and watershed approach can enable a community to share, develop or utilize successful strategies from existing programs. The resources available include training courses and publications offered by the Watershed Academy to assist with implementing storm water programs. These educational materials can be used by educators, private groups that adopt a watershed, or by municipal employees responsible for implementing the program. The Watershed Academy also offers Academy 2000, an internet-based learning tool for distance learning (www.epa.gov/owow/watershed/wacademy/).

New England Interstate Water Pollution Control Commission

The New England Interstate Water Pollution Control Commission (NEIWPCC) provides educational programs, promotes participation in water quality restoration programs, and

supplies outreach materials. NEIWPCC is involved with many projects in the region that currently includes developing outreach strategies and products for the Narragansett Bay Estuary Program with RIDEM. Highlights of the NEIWPCC offerings are the NEIWPCC website, an Environmental Training Center, youth programs, newsletters such as L.U.S.T.LINE and Water Connection, informational brochures, workshops, and technical advice.

American Rivers

American Rivers is a national, non-profit, conservation organization dedicated to protecting and restoring healthy natural rivers and the variety of life they sustain for people, fish, and wildlife. They provide innovative solutions to improve river health; raise awareness among decision-makers; serve and mobilize the river conservation movement; and are collaborating with their partners to develop a national "river agenda." This will create a unified vision for improving river health across the country. Along with conservation efforts, they promote public awareness about why healthy rivers matter for fish and wildlife, kayakers, canoeists, and anglers, and for our communities as a whole. American Rivers works closely with grassroots river and watershed groups across the country. Staff members also collaborate with other conservation groups, local citizens and businesses, and various federal, state, and tribal agencies to build coalitions and provide technical support. Their website provides educational resources including a Lewis and Clark animation about how the Missouri River has changed, River ABC's for kids and teachers, and a tools and links page. American Rivers has also published a Draft River Threats List and a River Agenda, which is a plan for creating healthy rivers. For more information, please visit http://www.amrivers.org/.

National Watershed Network

The National Watershed Network (NWN) is a coordinated national effort to encourage the formation of local, voluntary watershed partnerships and help assure that these partnerships successfully attain their goals. More than 70 diverse National Partners representing private and public corporations, government agencies, and non-profit organizations sponsor the initiative. Each National Partner agrees to provide financial and/or in-kind support. The Conservation Technology Information Center (CTIC), a non-profit data and technology information transfer center coordinate the national effort. In addition to maintaining the watershed network, National Watershed Calendar, and many other on-going tools for watershed coordinators, NWN also provides the following:

- Consistent messaging among all National Partners to state and local leaders of organizations, government agencies and companies.
- A connection between National Partners who have useful tools and coordinators of local watershed partnerships.
- A resource to share state activities and successes with state-level stakeholders in other states and regions.
- Encouragement for broad-based state-level partnerships that provide support to local watershed partnerships.

- A way to use and share processes and methods that have been found to work successfully for watershed coordinators.

For more information, please visit http://www.ctic.purdue.edu/KYW/nwn/nwn.html.

Natural Resources Conservation Service

The Natural Resources Conservation Service (NRCS) is a federal agency that works hand-in-hand with the people of Rhode Island to improve and protect their soil, water and other natural resources. For decades, private landowners have voluntarily worked with NRCS specialists to prevent erosion, improve water quality and promote sustainable agriculture. This includes helping landowners develop conservation plans, create and restore wetlands, restore and manage other natural ecosystems as well as advise on storm water remediation, nutrient and animal waste management, and watershed planning. NRCS is also an active participant in the "Year of Clean Water" Observance. NRCS provides several educational resources including tip sheets on topics like nutrient management and multi-media information on topics like backyard conservation. Conservation Programs offered and assisted by NRCS include:

- **Environmental Quality Incentives Program (EQIP)** – Provides technical, educational, and financial assistance to farmers to help them comply with environmental laws while encouraging environmental enhancement.
- **Farmland Protection Program (FFP)** – Provides funds to purchase the development rights to farmland, thus preserving quality farmland for agricultural use.
- **Wildlife Habitat Incentives Program (WHIP)** – Provides both technical assistance and cost-share assistance for farmers who want to voluntarily improve fish and wildlife habitat and restore and managing natural ecosystems on their property.
- **Watershed and River Basin Planning and Installation (PL566)** – Provides technical and financial assistance in cooperation with local sponsoring organizations, state agencies, and others for watershed-based projects. NCRS cooperates on projects for watershed protection; flood prevention; water quality improvements; soil erosion reduction; rural, municipal and industrial water supply; irrigation water management; sedimentation control; fish and wildlife habitat enhancement and wetland restorations.
- **Resource Conservation and Development (RC&D)** – Provides local people with the means to solve natural resource problems and promote sustainable use of natural resources in rural areas. The program aims to improve the quality of life by providing practical solutions for community development, land conservation, environmental enhancement and water management.
- **National Resources Inventory (NRI)** – This is a compilation of natural resource information on non-federal land throughout the United States. It captures data on land cover and use, soil erosion, prime farmland, wetlands, habitat diversity, selected conservation practices and related resource attributes at more than 800,000 scientifically selected sample sites.
- **Emergency Watershed Protection Program (EWP)** – It is a disaster recovery program made available in emergency situations when neither the state nor the local community is able to repair a damaged watershed.

- **Earth Team Volunteer Program** – Provides volunteers with opportunities to use their talents on behalf of conservation. Earth Team volunteers do not receive a salary from NRCS but they perform services that are essential to the conservation mission of the agency. Anyone 14 years of age and older can join the Earth Team by calling a local NRCS office.
- **Rhode Island Wildlife Habitat Incentives Program –** Focuses on restoring habitats along coastal features, freshwater wetlands, upland grasslands, and forest edges to restore specific native species and to improve overall biodiversity in these areas.

More information about NRCS can be found at http://www.nrcs.usda.gov/, while Rhode Island programs can be researched at http://www.ri.nrcs.usda.gov/ or by calling (401) 828-1300. Vicky Drew at (401) 822-8820 is the contact for the Rhode Island NRCS EQIP Program. He is located at 60 Quaker Lane, Suite 46 in Warwick, RI. Jeanne Comerford at (401) 822-8816 is the State Public Affairs Specialist.

Non-point Education for Municipal Officials

Non-point Education for Municipal Officials (NEMO) is an educational program for local land use officials that addresses the relationship of land use to natural resource protection. They believe that better land use decisions are the key to protecting the natural resources, community character, and long-term economic health of communities. Since proper land use is their focus, the people making land use decisions are the target audience. In the United States, this means local officials serving on land use boards at the county and municipal levels. NEMO provides research-based, non-advocacy professional outreach type education to these municipalities given that the local land use decision-making process is complex, political, and widely varying. Their education supplements state and federal regulations that push for better land use policies and practices. For more information, please visit their website at http://nemo.uconn.edu/. In Rhode Island, NEMO is also supported by URI. Please refer to URI's write-up, later in this section, to learn what NEMO offers within the state.

Narragansett Bay Commission

The Narragansett Bay Commission (NBC) was created in 1980 to correct and reverse a major municipal pollution problem that threatened the quality of Narragansett Bay. NBC now owns and operates RI's two largest wastewater treatment facilities, which they have successful upgraded and maintained to improve the bay. The Field's Point Plant is the larger of the two and serves Providence, North Providence, Johnston, and portions of Cranston and Lincoln. NBC also owns the 61 miles of sewer pipes and 39 combined sewer overflows (CSOs) that service this area. Fifteen of the CSO's discharge to the Woonasquatucket River, twelve to the Providence River, ten discharge to the Moshassuck River, and two more to the West River tributary to the Moshassuck. To continue improving the quality of Narragansett Bay, NBC will implement $300 million in clean water engineering project s in the next five years. The largest is the CSO storm water attenuation project, which aims to eliminate combined storm water and wastewater discharges into the bay during storm events. Combined sewerage from these discharge points will be diverted and later treated. Phase 1 (construction between 2001 and

2006) of the attenuation project will target the Providence River CSOs, including NBC's largest CSO near the Fields Point WWTF. Phase 2 (construction between 2008 and) will target the Woonasquatucket River CSOs.

NBC's efforts to improve the bay go beyond operating Providence's sewer system and wastewater treatment plant. They also have several public education and outreach projects. Prior to September 11, 2001 NBC offered tours to schools and the public of the Field's Point Plant, but these have been discontinued while the Port of Providence remains on high alert for terrorism. NBC hopes to provide these tours again in the future. Instead NBC has developed a program they bring to schools. They discuss the Woonasquatucket Restoration Initiative, how flow table control works, and how littering resulted in the trash netting on a CSO removing 50 tons of debris. For the CSO project this program discusses how the wastewater treatment plants operate, that the sewers were built to carry storm water and wastewater, how the rain will cause an overflow, and what the CSO project will do to correct this problem. Further education about the CSO project is available on their website through a cartoon called W.C. Leachfield. Lastly, NBC mails about an annual CSO study to the local community. For more information about NBC's education programs contact Jaime Sammons at (401) 461-8848 x377.

Rhode Island Water Resources Board

The RI Water Resources Board and the RI Water Resources Board Corporate are established by Chapter §46-15 of the RI General Laws. The General Assembly recognized that Rhode Island's water resources are among the State's most valuable-if not the most valuable-of all its natural resources. Together, these two agencies of government support the proper development, protection, conservation and use of the state's water resources while providing for economic development and protection for the environment.

Working in conjunction with the RI Water Works Association (RIWWA), this agency has promoted education and outreach activities during RI Water Week. Along with RIWWA, staff participates in the State Science Fair each spring judging water supply-related science projects for high school and junior high school students. In 2001, Board staff worked with an interdisciplinary committee to produce a series of radio spots to promote water conservation. RI Water Resource Board prepared an environmental education grant to the US Environmental Protection Agency to expand the radio campaign in 2002.

The RI Water Resources Board also offers educational programs including The Water for Today and Tomorrow: An Integrated Unit Study for Third Grade Students and The Story of Drinking Water Workbook, which discusses the water cycle and water conservation. They also provide flyers about water use and conservation that can be distributed to students or by mail.

The RI Water Resources Board Administrative Offices are located at 100 North Main Street, 5th Floor, Providence, RI, 02903. The RI Water Resources Board may be contacted at (401) 222-2217 ext. 2218

Providence Water Supply Board

The Providence Water Supply Board (PWSB) was initially created in1915. The purpose of the PWSB is to supervise, manage and control water collection, storage, purification, and distribution systems of the City of Providence and other areas within its jurisdiction; and to protect and conserve the water supply. The PWSB has practiced aggressive watershed management and source protection since its establishment, in order to protect and maintain the high quality of source water for the system. This management program is structured to protect the PWSB's raw water sources before they can be polluted. The focus of the PWSB's watershed protection and land management program has been and continues to be land acquisition, overseeing the use of the land in the watershed, providing close surveillance of the entire watershed, enforcing rules and regulations to protect water resources, and monitoring tributary streams and reservoirs.

The PWSB works with the NRICD to educate students about their watershed. On their website www.provwater.com, you can find a Kid's Page including the children's story entitled "Life Cycle of a Water Drop". This story follows a water drop, "Walter Splash", as he makes it way through the water cycle. They also sponsor a Drinking Water Award at local Science Fairs. In addition, they allow students to tour the treatment plant during Water Week. During these tours the staff stresses the importance of keeping the watershed clean and how certain activities will have an impact on it.

For more information about PWSB's education and outreach programs please visit http://www.provwater.com/default.htm or contact David Nickerson at (401) 521-6300, 552 Academy Ave., Providence RI 02908.

Environment Council of Rhode Island

The Environment Council of Rhode Island (ECRI), Rhode Island's affiliate of the National Wildlife Federation, is an association of groups and individuals that includes the Southern Rhode Island Conservation District, Save the Bay, Rhode Island Public Research Interest Group, and many others. ECRI has established the ECRI Education Fund (EdFund) to "enhance the long-term stewardship of Rhode Island's natural resources." EdFund solicits and manages government and foundation grants to support its research and education initiatives that include developing media and programs to educate the public about environmental health and natural resource restoration.

ECRI generally meets the first Wednesday night of the month at 6:45 pm at the Audubon Society of RI headquarters located at 12 Sanderson Road in Smithfield. Members of the public are welcome to attend and participate in the meetings. ECRI may be contacted at P.O. Box 9061, Providence, RI 02940, (401) 621-8048 www.environmentcouncilri.org.

Northern Rhode Island Conservation District

The Northern Rhode Island Conservation District (NRICD) is a non-profit, quasi-public organization that functions as a facilitator for meeting the needs of the local land user in the

conservation of soil, water and other related resources. NRICD's mission is to foster a community-based, locally led approach for the stewardship of northern Rhode Island's natural resources through educational campaigns and outreaches into local communities, as well as providing technical assistance to Providence County constituents. The NRICD has established partnerships with the Woonasquatucket and Blackstone Watershed Councils as well as the Rhode Island Watershed Partnership Coordinating Council.

The NRICD supports several environmental education programs, one of which is the Woonasquatucket River Watershed "Do's and Don'ts" Education Program provided in cooperation with USEPA Region 1's Urban and Environmental program. The document is published seven different languages (English, Spanish, Portuguese, Hmong, Vietnamese, Cambodian, and Laotian). Presentations are given to third grade classes as a free service. The program informs and educates residents of the Woonasquatucket River Watershed of the health and environmental risks, and safety measures associated with the contamination that has been found in the Woonasquatucket River. A non-point source pollution model enables students to gain a basic knowledge about water pollution and see the effects of pollution on water bodies. The program also discusses what things can be done to help minimize the non-point source pollution that reaches the river through improved environmental awareness. The students are provided with information to share and activities to complete with their parents that discuss the many ways to reduce non-point source pollution including reducing litter, pet wastes, fertilizer use and proper disposal of household chemicals. The NRICD directly service over 1,000 students each year in the Woonasquatucket River Watershed. In addition, they reach another 1,000-2,000 residents through indirect methods such as distributing materials.

The NRICD's District Office is located at 17 Smith Avenue, Greenville, RI 02828, (401) 949-1480. Board Meetings are the 1st Wednesday of each month from 7-9 PM at the District Office and are open to the public.

University of Rhode Island

There are several outreach programs offered by the University of Rhode Island's (URI) Cooperative Extension Service that may be beneficial to the City for its storm water education and outreach program. The university's programs include:

- URI Nonpoint Education for Municipal Officials (NEMO). This program offers training in the science, management, and regulation of water resources for community leaders and volunteer board members. Its goal is to provide decision makers with the skills and resources to identify local water quality problems and to adopt effective pollution controls. General brochures and source order assessments are offered free of charge. Educational programs are provided throughout the year, ranging from evening or one-day workshops to intensive, small group trainings that are tailored to meet the participants' interests and needs. Most programs can be brought to the town or city. Events are conducted in partnership with State planners and regulators, consulting professionals, the University community, and citizen groups. For more information

contact Lorraine Joubert, URI NEMO at (401) 874-2138 or refer to their website at www.uri.edu/ce/wq/mtp/html/munitrai.html.

- Rhode Island Home*A*Syst. A consortium of educational projects in twenty-five states, this project focuses on educating and training residents in the community on environmental and health risks inside and outside their homes. The program includes topics on storm water management, hazardous material storage and handling, and yard and garden care. Informational materials are also available in the form of books, displays, educational models, fact sheets, and workbooks. Contact information: URI Cooperative Extension, Department of Natural Resources Science, 001D Coastal Institute, 1 Greenhouse Road, Kingston, RI 02881, (401) 874-5398 (www.uri.edu/ce/wq/has/html/has.html).

- GreenShare. This program provides training through seminars and workshops for professionals in the retail and service sectors of the landscaping industry at the Cooperative Extension Education Center (CEEC). Topics on environmentally sound methods of managing insects and diseases in urban and suburban landscapes are discussed at CEEC and its demonstration gardens. Target audiences include growers, landscapers, garden centers, and homeowners. GreenShare uses newsletters, newspapers, and television to communicate with the public (www.uri.edu/ce/ceec/greenshare.html). The Cooperative Extension Education Center is located at 3 East Alumni Avenue, Kingston, RI 02881, (401) 874-2900.

Roger Williams Park Zoo

The Roger Williams Park Zoo (Zoo) is described as the ultimate living classroom. The Zoo's education department offers many exciting programs for people of all ages. The Zoomobile travels to schools, community centers, and retirement homes spreading the important message of conservation of our natural world. On-site programs include Zoocamps, Preschool and After-school Adventures, Overnights, and Family Night Hikes. The following summarizes the Zoo's educational efforts for various age groups:

- **Preschool** - Each year, more than 2,000 preschool children participate in educational programming at the Zoo. The programming includes ninety-minute educational sessions throughout the year for parent-child pairs from across the state and nearby Massachusetts. Each session highlights information on a particular species and includes a craft-making aspect, which reinforce the learning experience. After-school programs reach an additional 1,000 students each year, and we offer Pre-K programs to stimulate and entertain children ages 3 to 5.
- **Elementary** - The Zoomobile carries the Zoo's educational messages of natural history and conservation to the state's school's and beyond. Last year the Zoomobile visited over 300 elementary schools and more than 15,000 children and teachers. Over fifteen hundred elementary school children take part in Zoo Overnights and in the Zoo's weeklong summer, spring, and winter Zoo Camps. Tours of Zoo exhibits are available to school groups.

- **Middle/High School** - In addition to the ZooMobile the Zoo offers an award-winning ZooPower program that trains and pays inner-city youths to annually teach more than 700 children in after-school community center programs about the environment. Tours of Zoo exhibits are available to school groups.
- **College/University** - College students can come to the Zoo for 10-week animal science internships during which they experience many of the aspects of a zoo-related career. The Zoo also offers internships in environmental education and tourism.
- **Teacher Trainings** - The Zoo offers a number of training seminars for area teachers with topics ranging from endangered species conservation to habitat-specific workshops.
- **Adult Education** - The Conservation Lecture Series is the Zoo's most popular adult education program. Afternoon lectures are offered on select Sundays in January and February and are free with Zoo admission. The presentations are conducted by Zoo staff that has completed field research work. In addition, the Zoo hosts Thursday evening lectures during the winter months. These programs feature visiting lecturers who are doing conservation work around the globe.

The Zoo's Education Department Program Registrar can be contacted at 401-785-3510 (ext.358), or send an e-mail to gdichiara@rwpzoo.org.

3.3 Educational Targets

While a future education program should be designed to offer a broad discussion of storm water quality issues, there are issues that should be targeted in every municipality as the focus of the program. These targets can include diverse audiences, subwatersheds and sources of pollution.

3.3.1 Subwatersheds

Critical subwatersheds in Providence include those where surface water quality has already been impaired or where current land uses have greater potential for future water quality impacts.

Providence is primarily composed of the Woonasquatucket and Moshassuck watersheds. These rivers combine to create the Providence River and its watershed. The remaining portions of Providence are divided between the Pawtuxet, Seekonk, and Pocassett Watersheds. Roger Williams Pond and Mashapaug Pond are both subwatersheds to the Pawtuxet. The Woonasquatucket River is currently impaired by pathogens, cadmium, copper, lead, mercury, poly-chlorinated-biphenyls (PCBs), dioxins, hypoxia, and excess algal growth. These impairments are likely caused by both point and non-point sources inside and outside of Providence. The Moshassuck River is currently impaired by pathogens and total suspended solids (TSS). The Providence River shares some impairments with these tributaries and is listed on the State's 303(d) for hypoxia, nutrients, metals, and pathogens. The Roger Williams Park Ponds are impaired with pathogens, hypoxia, nutrients, and excess algal growth. Mashapaug Pond suffers from nutrient and hypoxia impairments. Typical causes of pathogen impairments are non-point sources (i.e., pet waste), illicit discharges to storm sewer systems, and combined sewer overflows.

3.3.2 Diverse Audiences

Data obtained from the 2000 U.S. Census of Providence indicates for persons over the age of 5 years, approximately 43% of the reporting population speaks a language other than English and 21.1% indicated they do not speak English very well. Spanish is the second most common language after English and is spoken in 27.7 % of Providence's homes. English literacy levels were not reported, so it cannot be determined what percentage of the population that can speak English "very well" can also read well. The ancestries reported by were quite varied, but the ethnic ancestral groups represented are listed in order of greatest number first as follows: Italian (13.8%), Irish and Celtic (9.7%), English (4.9%), Subsaharan African (4.3%), Portuguese (4.0%), French including Alsatian excluding Basque (3.8%), and German (3.4%). Almost half of the population (45.3%) reported ancestries other than the top twenty-seven listed. The percentages are relative to the total population. The ancestry question allowed respondents to report one or more ancestry groups; however, only the first two responses were coded. The data presented in the census refer to the total number of ancestries reported (up to two) by people living in Providence. In 2000, 52,146 persons of Hispanic origin resided in Providence, representing 30.0% of the population. This demonstrates an increase of 27,164 or 108.7% from the 1990 Hispanic population of 24,982. 75% of Providence residents under the age of 18 are a minority with 50% being Hispanic. Providence's total population has increased 8.02% since 1990 making it one of the fastest growing cities in the northeast.

While the demographics in Providence are changing faster than the population, the data presented in the 2000 census indicates that Hispanic and Spanish-speaking population would be a good group to target for multi-lingual education and outreach programs. Approximately 27% of the population was below the poverty level in 1999. Including this low-income group as an outreach target in the City's storm water program is also recommended.

One way to reach diverse audiences, including the 14 % that speak a language other than English and Spanish, is through advertising at local cultural centers or contacting religious leaders. This method can help to determine whether education and outreach materials should be printed in additional languages.

3.3.3 Sources of Pollution

Given the current conditions in Providence, a future public education program should target the following sources of pollution.

- *Combined Sewer Overflows:* There are 39 CSO's in the city of Providence that discharge storm water and wastewater to its rivers and the Narragansett Bay during storm events. While NBC provides some education about its CSO project, a new program could be developed to educate businesses on practices that minimize storm water run-off.

- *Illicit discharges:* The sources of pathogens in the Woonasquatucket, Mooshassuck, and Providence Rivers are many, however, a typically significant source of pathogens

are illicit discharges. Roger Williams Park Ponds in the Pawtuxet watershed is also impacted by pathogens. An education program could be targeted to both landowners and contractors in Providence, about what defines illicit discharges and the importance of adhering to illicit discharge regulations

- *Pet waste management:* Another potentially significant source of pathogens is pet waste. An education program could be targeted to pet owners on the importance of proper disposal and collection of pet wastes.

- *Solid Waste disposal:* Improper waste disposal has been observed in watercourses by the river associations and their volunteer groups, even though the City offers means for the proper disposal of these wastes. Every year, during Earth Day and other regularly scheduled clean-up efforts, volunteers remove debris, ranging from litter to equipment parts, from Providence's rivers. During NBC's last clean-up event of the Woonasquatucket River 400 tires were removed and a 30-yard dumpster was filled with debris. An education program could be targeted to residents regarding proper waste disposal practices and outlining available waste disposal options (i.e. recycling and household hazardous waste collections).

3.4 Implementation Alternatives

The goal of a public education program in Providence should include several elements as follows:

- Provide a general education to the public about storm water quality issues that will both improve their awareness, change habits that could impact water quality, and build support for funding of storm water quality programs.

- Develop school programs that will build long-term awareness and support for storm water programs.

- Target specific areas and issues where enhanced public education could provide significant benefits.

While a number of resources are available to Providence for a future public education program on storm water quality, work still needs to be completed in actually organizing and implementing a formal program. The following outlines alternatives for implementing this minimum control measure.

3.4.1 Provide General Education

- Establish a Phase II Storm Water Committee of local stakeholders (WRWC, ASRI, Save the Bay, and city representatives). The purpose of the local committee would be to continue the work in planning and organizing public education events, coordinating with school curriculum committees and providing a potential source of speakers for a

speaker's bureau. Media, such as newspapers (Providence Journal) or the City's website, should be used to notify residents of the need for a committee and an organization meeting.

- Collaborate with neighboring municipalities (i.e. Cranston and Johnston) to build or to jointly request assistance from groups such as the Environment Council of Rhode Island to develop an educational campaign for this focus area. A committee of representatives from participating communities should be established to coordinate the campaigns. This could be an extension of the existing Storm Water Committee organized by the City Planner. The campaigns should center on common themes in this region such as proper pet waste management, proper turf management, and the difference between storm and sanitary sewers.

- Develop a "New Neighbor" welcoming program. This program would inform residents of the City's storm water program, BMPs, Providence's Urban Environmental Initiative, and information about storm water pollution prevention. Provide simple, attractive pamphlets with the basic information necessary for new residents to determine how to prevent storm water pollution and the importance of citizen involvement including a list of community organizations. It may be beneficial to develop watershed specific programs that focus on the critical resources in that area, why the resource is important, how they can individually protect their watershed. The package should also include emergency phone numbers, such as RIDEM, a local storm water hotline, and the fire department, and what to do in the event of an accidental spill. The NRICD should be contacted to determine if they would want to coordinate this program as they have developed a similar program for the Scituate Reservoir Watershed. Materials that could be included to focus on local issues are:

    - *10 Simple Things You Can Do To Help Clean Rhode Island Waters* (RIDEM, Office of Water Resources)
    - *Don't Trash Grass.* Oscar's Guide to Lawn Care (OSCAR)
    - *Rhode Island Rural Lands Coalition* (SRICD)
    - Natural Resources Facts – *What is a Watershed?* Fact Sheet No. 90-20 (URI Cooperative Extension)
    - WRWA's joint map & flyer of the Woonasquatucket River watershed
    - Save the Bay's *Have You Seen This Fish* flyer
    - Rhode Island Water Resources Board flyer – *water is LIFE don't waste it*
    - Natural Resources Facts – *Lawn Care Simplified: Your Guide for a low-maintenance, high water quality landscape*, Fact Sheet No. 94-4 (URI Cooperative Extension)
    - A copy of Providence's City Directory and City Action Guide, similar to what is available on Providence's website.

- Urge municipal officers to attend programs from URI's non-point source education for municipal officers, so that they can make more informed storm water and land use

management decisions. URI Cooperative Extension provides many of these programs at their campus and may be able to offer some presentations at City facilities.

- Notify those in the local landscaping community, including the School and Parks Department, of URI's GreenShare program. At a minimum display and distribute the URI pamphlets at public fertilizer providers. Proper pesticide and fertilizer use could greatly reduce the amount of excess nutrients causing hypoxia and algal growth impairments in Providence's water resources.

- Consider teaming with groups such as the WRWC, BVTC, and the National Park Service's Rails to Trails program to develop language for public kiosks and/or signage to be placed on public lands, which provide access to natural resources. Riverpoint Park's Riverwalk and the new rail trail urban greenway with bike paths and access points to the Woonasquatucket are examples of such locations. The kiosks and signs should provide information to the public about the significance of that water's quality, the effects of storm water, conservation, and its significance to the community.

- Develop a storm water awareness exhibit to be displayed at the City Hall, public libraries, schools, or even some of the City's many public venues (i.e., Kennedy Plaza, Dunkin Donuts Civic Center). The display can be changed to address varying issues throughout the permit term. Some recommended features include Year 1, general education (particularly focused on changing behaviors that negatively affect the quality of storm water), Year 2, ways to discourage illegal dumping and its impacts, Year 3 proper turf management.

- Utilize volunteers for simple tasks that would improve water quality as well as raise the public's awareness. Public participation will enhance the public education of the storm water program with the following tasks:

    - Stencil catch basins with informational phrases such as, "NO DUMPING, DRAINS TO RIVER."
    - Assist with installing and operating kiosks.
    - Create local speakers panel to discuss the City's storm water program and pollution prevention with targeted residents and businesses.

3.4.2 School Programs

- Meet with school officials responsible for environmental/science curriculum development. Ensure that these officials are made aware or provided with copies of the educational resources presented herein. While the schools provide adequate field trips and in school presentations students could benefit from educational programs more specifically related to storm water pollution prevention. Curriculums could be supplemented with presentations like AWEsome! and Project Wet provided by SRICD and ASRI respectively. The BVTC, URI, and/or Catch the Science Bug can also be contacted for more educational opportunities

- At the Middle and High School level, the public schools could develop environmental clubs to enhance the science curriculum with more hands-on activities like those performed by the Moshassuck Monitors. Clubs can be formed between the public schools or with private schools, similar to how the Moshassuck Monitors was a joint effort between Wheeler and Moses Brown. High School clubs could also prepare presentations for Middle and Elementary Schools. It would also be beneficial for the clubs to publish a newsletter educating the student body and community of local environmental news, achievements, volunteer opportunities and applicable education and conservation tips.

- A subscription to the Green Teacher or similar periodical would be a useful resource to circulate throughout the system. Other resources discussed in this manual should be shared with local educators.

- State or regional organizations could plan and conduct a regional training event for teachers and could also develop a sample curriculum. Nearby cities and towns sharing Providence's watersheds and looking to their science curriculums include Cranston, Johnston, and Pawtucket. Some of the training could be provided by third parties (a consultant, URI, RIDEM, or SRICD). A regional effort would likely be the most efficient method to accomplish this task.

- To assist in the funding of these educational efforts, Environmental Educational Grants are available through the USEPA and National Science Foundation

3.4.3 Target Specific Areas and Issues

- First develop one set of flyers/public meetings for the Providence, Woonasquatucket, and Moshassuck River watersheds that focus specifically on bacterial impacts from illicit discharges and pet waste management. Another set of flyers/public meetings focusing on nutrient loading from landscaping practices can be prepared for Mashapaug and Roger William Park Ponds in the Pawtuxet River watershed. A third set of flyer/public meetings should be set up for the general public. This general series should be beneficial to all Providence residents including the discussion of negative impacts from CSOs and dumping. A newspaper releases and annual updates in the Providence Journal may also be helpful to generate some interest with this issue. An example of a five year public education curriculum is as follows:

TABLE 3.1
SAMPLE PUBLIC CURRICULUM

Target	Year 1	Year 2	Year 3	Year 4	Year 5
Providence, Woonasqua-tucket, and Moshassuck River Watersheds	General storm water/storm drain education, "What is a watershed?"	Illicit discharge detection & CSOs	Targeted commercial and/or business flyer	Pet waste management	Proper waste management and CSO status
Mashapaug & Roger William Park Ponds Watersheds	General storm water/storm drain education, "What is a watershed?"	Watershed Protection, Proper fertilizer use	Proper waste management (the impacts of dumping)	Watershed Protection: Noted improvements from proper fertilizer use	Plan for the future, low impact development, land trusts
General	General storm water/storm drain education, "What is a watershed?"	Proper waste management (impacts of dumping)	Illicit discharge detection & CSOs	Watershed Protection summary guidelines	Plan for the future, low impact development, land trusts

- Identify businesses in Providence that has significant potential to impact water quality. These businesses could include significant commercial developments that generate large traffic volumes, and auto maintenance facilities that have potential for exposed materials and who handle hazardous wastes. Develop and distribute a mailer to these businesses about pollution prevention, proper waste management, BMPs, and operation and maintenance issues. A volunteer audit of these facilities may also be proposed. Annual or biannual attendance at a Chamber of Commerce meeting may be a way to reach these businesses. An incentive program such as an annual award to most environmentally focused businesses that is advertised in the newspaper could encourage participation in the audit. Based on a review of federal databases the following regulated industries have been identified in Providence:

TABLE 3.2
REGULATED INDUSTRIES

Type of Industry	Number in City
Health services	24
Miscellaneous manufacturing industries	18
Automotive repair, services & parking	14
Fabricated metal products, except machinery & transportation equipment	13
Automotive dealers & gasoline service stations	11
Printing, publishing, & allied industries	8
Primary metal industry	4
Educational services	4
Wholesale trade durable goods	4
Personal services	3
Chemical and allied products	3
Electric, gas, and sanitary services	3
Construction special trade contractors	2
Depository Institutions	2
Unites States Postal Service	2
Nonclassifiable establishments	2
Measuring, analyzing, & controlling instruments; photographic, medical, & optical goods; watches & clocks	2
Motor freight transportation & warehousing	2
Wholesale trade-non-durable goods	1
Administration of Environmental Quality and Housing Programs	1
Business services	1
Food Stores	1
Food & kindred products	1
Water Transportation	1
Textile Mill Products	1
General Merchandise Stores	1
Industrial & commercial machinery & computer equipment	1
Petroleum refining & related industries	1
Paper & allied products	1
Miscellaneous repair services	1
Local & suburban transit & interurban highway passenger transportation	1
Heavy construction other than building construction contractors	1
Unknown/other*	257

*These facilities are regulated as they store or handle hazardous waste.

4.0 PUBLIC PARTICIPATION/INVOLVEMENT

4.1 State and Federal Regulatory Requirements

The objective of this minimum control measure is to encourage public participation in the City's storm water program. The anticipated benefits of public involvement and the success of the program are: free intellectual and labor resources, greater support for programs operated by citizen volunteers, faster implementation of minimum control measures (such as illicit discharge detection), fewer legal challenges, and a potential measure of program success. Involvement can include participating in public meetings, providing legislative activism, developing and implementing BMPs, or becoming an educator. To satisfy the requirements of this minimum control, the city must:

1. Comply with applicable State, Tribal, and local public notice requirements; and

2. Determine the appropriate BMPs and measurable goals for this minimum control measure.

4.2 Available Resources

The following section describes some of the organizations and programs that may help the City implement the public participation component of its storm water program. Encouraging public participation in existing volunteer programs that are offered by local and regional groups can minimize the need for creating new programs and allow the City to focus its financial and human resources on outreach and sponsorship for these programs.

4.2.1 School Programs

The school department promotes student involvement in community outreach and environmental education projects. There are no programs in place for students to participate in storm water pollution prevention or cleanup projects, however students have been involved in water sampling projects. Students also create Science Fair Projects, conduct research, and compete in events like the Science Olympiad that provide some community education.

4.2.2 Boy and Girl Scouts of America

Boys and girls may be involved in Scout programs from ages 5 through 17 and are supervised by adult volunteers. Scouts are involved in various community service projects and can be beneficial to implementing outfall identification, storm drain marking, and river cleanup projects or environmental awareness outreach programs.

Coordination with local Scout leaders is necessary to implement any activity with their group. The Boy Scouts have eight District Executives that meet monthly to discuss possible projects. Material about potential storm water related projects can be distributed at this meeting and then

passed on to troop leaders. The Girl Scouts have Field Coordinators and Service Managers in every town. Information about potential projects can be shared with the Field Coordinators, who will in turn pass the information onto the Service Managers and then the troops. Distributing information about the impacts of polluted storm water on our environment, the city's Phase II program, and the capacity in which boy and girl scouts can help their community are the first steps to promote participation.

The Boy Scouts provides its youth with a conservation program designed to be incorporated throughout the Scouting program and teaches awareness and understanding of conservation as a wise and intelligent management of natural resources. The conservation "Good Turn" program is an opportunity for scouts to join with conservation and environmental organizations (federal, state, local, and private) to carry out a conservation "Good Turn" in their home communities. The Boy Scouts also provide an outdoor adventures program of which their "Leave No Trace" policy plays a key role. This principles of this policy include planning ahead (not bringing materials that create waste and knowing the area to be explored), traveling and camping on durable surfaces (not trampling vegetated areas which can lead to erosion), dispose of waste properly (pack out what you pack in, dispose of wastewater far enough from surface water), leave what you find, minimize campfire impacts, respect wildlife, and be considerate of other visitors. A "Leave No Trace Awareness Award" is available to scouts who successful follow these principles. In Rhode Island, scouts have participated in many activities in their communities including storm drain marking projects with Save the Bay and Earth Day cleanups in the Blackstone Valley and Woonasquatucket River Greenway.

The Girl Scouts are offering partnership initiative called Linking Girls to the Land. This partnership is between the Girl Scouts of the USA and nine natural resource conservation agencies including USDI Bureau of Land Management, USDA Forest Service and USDA Natural Resource Conservation Service. This initiative encourages girls to become involved in conservation and natural resource issues and careers on a national and local level. Most program activities fall into four areas; environmental education, volunteer service, outdoor skills development, and career awareness.

The Water Drop Patch, a facet of Linking Girls to the Land, is a project jointly developed by the United States Environmental Protection Agency and the Girl Scout Council of the Nation's Capital (GSCNC). The participants gain hands-on skills in water management and resource conservation by encouraging the girls to:

- Make a difference in their communities by becoming watershed and wetlands stewards;
- Use their skills and their knowledge to educate others in their community about the need to protect the nation's valuable water resources;
- Explore the natural world to gain an interest in science and math; and
- Use the Internet as a source of information.

For additional information about the Water Drop patch view the project booklet at www.epa.gov/adopt/patch/ or by calling the National Service Center for Environmental Publications at 1-800-490-9198.

Funding for these can be acquired through the EarthPACT (Plant and Animal Conservation Team), which will award implementation grants to each council for up to $2,500. The EarthPACT encourage the formation of partnerships with local environmental education, nature, or science-related organizations, business or county government agencies.

The Girl Scouts are also offering a new program called GirlFACTS (Girls, Families, and Communities Together in Science). This program offers two related activities entitled "geology rocks" and "weather wise" which discuss the topics of the water cycle and acid rain. The topics of storm water runoff pollution and prevention could easily be added as a topic to these established programs.

The Girls Scouts have also been involved in Earth Day community clean-ups and Save the Bay's Storm Drain Marking Project. The Girl Scouts of Rhode Island office is located at 125 Charles Street, Providence, RI 02904, (401) 331-4500 or (800) 331-0149 and may be found at www.gsri.org. The field coordinator of the Providence Girl Scouts program is Ms. Janette Tomas at extension 407.

The Boy Scouts of America Narragansett Council office is located at 175 Broad Street, Providence, RI 02903 and may be found at www.narragansettbsa.org. The Executive Director of the area, which includes Providence, is Mr. Pete Cournoyer (401) 351-8700 ext. 314. Mr. Cournoyer can provide contact information for group activities in Providence.

4.2.3 Citizen's Groups

The groups outlined in the Public Education/Outreach minimum control measure may also provide opportunities for public involvement in a variety of watershed based or specific water body protection and cleanup projects. Some existing projects may help achieve Providence's goals in their program with or without modification and, in some cases, new programs may need to be established. The following is a listing of groups and a summary of some of their current activities available to residents.

Save the Bay

Some of the many volunteer opportunities STB offers for citizens are published in a newsletter entitled BaySavers and at www.savebay.org/volunteer/index.htm. Interested persons may also contact Stan Dimock, volunteer coordinator at sdimock@savebay.org or (401) 272-3540, ext. 130. Volunteer programs include:

- BayWatcher. STB's citizen monitoring program that encourages volunteers to become involved with the restoration and protection of Narragansett Bay by providing volunteers with training and activities such as shoreline surveys, storm drain stenciling, seal monitoring, salt marsh cleanup and restoration.

- Legislative volunteer positions involve writing letters to newspapers about key Bay issues, attending and testifying at public and legislative hearings, organizing group meetings with local, state, or federal officials about environmental issues.
- Save The Bay holds several fundraisers and special events per year in support of programs and goals. Volunteers assist with decorating, registration, bartending, parking and many other tasks.
- STB office support volunteers assist with the reception, mailings and answering telephones.
- Volunteers can help students learn about Narragansett Bay aboard the M/V Alletta Morris with the BayCorps. The boat is d to provide a hands-on education about marine biology, water quality, and human impacts on the bay.
- Save The Bay attends approximately fifteen fairs and festivals each season in Rhode Island. Volunteers help sell STB merchandise, encourage people to become members of STB, and educate the public regarding current environmental issues regarding Narragansett Bay. STB offers training to Fairs & Festivals Team volunteers.
- STB offers internships that allow college students to earn credits. Examples of internship positions previously or currently offered are:

    - Web Content Development
    - Habitat Restoration
    - Program Planning and Development
    - Communications (P/R & Marketing)
    - Environmental Law Clerk

STB offers a variety of memberships for individuals, families, and businesses. Current rates for membership are $30, $45, and $100 per year, respectively. Included with membership is a one-year subscription to the Bay Bulletin (STB's quarterly newsletter), discounts on Explore The Bay educational programs, discounts on STB merchandise, a monthly STB member e-mail, invitations to exclusive STB events, and a Save The Bay bumper sticker.

USEPA's Urban Environmental Initiative

The Urban Environmental Initiative (UEI) is a pilot program launched in 1995 under the USEPA in Region 1, New England, to address environmental and public health problems in urban cities. The UEI facilitates community based environmental protection in the targeted cities of Providence, Boston, and Hartford. The UEI program takes an active role in listening to community needs and concerns, identifying projects, and providing resources to implement projects that make measurable improvements in public health and the quality of the urban environment. In Providence, UEI's involvement started with a conference on rats to gauge public priorities in urban environmental and public health issues. This conference launched into the creation and development of a Mayor's level task force targeting vacant lots. The Mayor's Vacant Lot Task Force has developed a wide set of recommendations that it is now implementing. UEI supports collaboration on urban environmental and public health issues between a wide range of stakeholders in Providence including local residents, non-profit organizations, industry, city and state agencies, government representatives and leaders, and

academia. Although there is still more work to be done, UEI and its partners have made substantial progress. Using similar approaches as developed for vacant lots and lead poisoning, UEI is expanding its work to tackle contamination in urban rivers, asthma, and open/green space. The following summarizes UEI's recent efforts in several key areas:

- **Vacant Lot Task Force –** Out of 4,000 vacant lots identified by the task force, a total of nearly 600 lots have been revitalized since 1996. Over 200 vacant lots have been cleaned or returned to productive use to date. The Vacant Lot Task Force recommended developing public service announcements on environment and public health and safety issues related to vacant lots (trash, rats, animal waste). These public service announcements were developed by the Rhode Island School of Design and are currently being televised in Rhode Island.
- **Keep Providence Beautiful:** UEI has supported Keep Providence Beautiful in their efforts to revitalize open or abandoned space in urban neighborhoods. Design plans for three sites in the West End, Lower South Providence, and Smith Hill neighborhoods are complete and revitalization and public outreach have been initiated. The Smith Hill site was completed by the end of 1998.
- **Providence Environmental Strike Team (PEST) –** UEI supported the creation and operation of PEST. This program tackles a wide range of environmental issues. Over 10,000 tickets for violations have been issued. 4,000 cases have been adjudicated. 500 cases have gone to trail with a 92% conviction rate. $140,000 in fines have been collected with $1.2 million outstanding. 595 Clean and Lien actions taken, with approximately 250 owners making voluntary compliance.
- **Urban River/Wetlands** – The focus of UEI work in Providence has been to disseminate environmental and public health information to urban residents and support revitalization efforts of the Urban Rivers Team and the Woonasquatucket River Greenway Project. UEI has also created Health & Education Subcommittee of the Urban Rivers Team, provided press releases to local residents, and developed Soil Sampling Program and GIS Mapping. More detailed information about UEI's efforts with the Woonasquatucket River is provided at http://www.epa.gov/region1/ra/woonas/.

For more information about UEI's efforts in providence please visit http://www.epa.gov/region1/eco/uei/provid/index.html or for contact information please visit http://www.epa.gov/region1/eco/uei/contact.html.

Providence Neighborhood Planting Program

The Providence Neighborhood Planting Program (PNPP) is a tree planting partnership between the City, the Mary Elizabeth Sharpe Street Tree Endowment, the Helen Walker Raleigh Tree Care Trust, and the people of Providence. In May of 2002 PNPP celebrated its 13th anniversary and planted its 5000th tree. More than 400 participating groups have been involved with this program. Newsletters from the Mayor's office provides updated information about PNPP and other environmental initiatives around the City, such as Earth Day Clean-ups and volunteer seed planting. PNPP can be contacted at (401) 351-5802 or www.pnpp.org.

YouthBuild Providence

YouthBuild Providence is an educational program designed to provide 16- to 24-year-old Providence residents a second chance at earning their General Education Development (GED) diploma while learning valuable occupational and life management skills. They use construction training, leadership development, and academic preparation as tools to teach the values of discipline, integrity, and work. YouthBuild Providence is a supported project of the Providence Plan, a private, non-profit 501(c)(3) organization. The Providence Plan works on a number of different projects that aim to revitalize Providence and its neighborhoods. YouthBuild Providence is an organization that could potentially help with environmental projects, especially those that would assist Providence's DPW. Currently, YouthBuild Providence and The Providence Plan have close ties City Hall and the Providence Department of Planning and Development. Both collaborate with and oversee many of their projects. For more information on YouthBuild Providence, contact Mr. Saah N'Tow at (401) 273-7528, by e-mail at sntow@provplan.org, or by mail to The Providence Plan, 56 Pine Street, Suite 3B, Providence, RI, 02903. Their website at http://www.provplan.org/html/projects/youth.html provides additional information as well.

Audubon Society of Rhode Island

Some of the current volunteer opportunities within the ASRI include helping at special events, working in the education department, participating in environmental projects, distributing mailings, maintaining refuges, being a part of a bird monitoring project, and designing artwork. They also offer student-volunteering opportunities for students who are interested in exploring career options in the conservation field, wildlife biology, and non-profit administration.

The ASRI joins an international effort every September with their "Get the Drift and Bag It" beach cleanup event. For 18 years the ASRI has participates in the Ocean Conservancy's International Coastal Cleanup. The ASRI's participation for 2001 included 1,258 people, collecting 12,095 pounds of trash collected over 47 miles of Rhode Island beaches. This year the numbers increased to over 1,500 people at 56 locations who collected 15,741 pounds of debris.

ASRI also offers many membership options for the family, individual, student or non-profit organization. Current rates are $35, $25, $10 and $20 respectively. Members are eligible for benefits including discounts on trips, educational programs, hikes and workshops; discounts on all purchases from the Nature Shop at Powder Mill Ledges Refuge; and the bi-monthly newsletter, the *ASRI Report.*

For current volunteer opportunities contact Dot Mathurin, Volunteer Coordinator, at dmathurin@asri.org , or call (401) 949-5454.

Woonasquatucket River Watershed Council

As stated in the previous section WRWC has educational mapping that shows the entire watershed and summarizes many of the important sites and activities within it. These sites have historical, cultural, recreational, or environmental significance. Also, the WRWC has prepared street signs that they will be installing at the watershed boundaries. These signs inform the public that they are entering a watershed and that their activities have the ability to impact the Woonasquatucket River.

Friends of the Moshassuck

The Friends of the Moshassuck first performed water quality monitoring several years ago, while recent efforts have turned to shoreline and habitat restoration. At the Collyer site in Providence, they have performed cleanups, planted trees, and suppressed knotweed. This is all part of creating a New England forest at this site. Friends of the Moshassuck works with Providence's groundwork summer crews and with volunteers from the community.

Blackstone Valley Tourism Council

The Blackstone River Watershed Council organizes many volunteering events such as storm drain decaling and Earth Day clean ups. The council has decaled over 300 drains throughout the watershed. In 2001, the Earth Day clean up attracted over 200 volunteers who filled one, three ton dumpster with tires and another three ton dumpster with large debris, such as washing machines, car parts, bikes, etc. The Council plans to develop a monitoring program within the watershed to identify storm water drains and test periodically to see if physical improvements and other pollution prevention activities have improved water quality. At this point, acquiring funding as the biggest obstacle for the development of the program. Interested persons may contact Tammy Gilpatrick at (401) 724-2200 for more information on current volunteering opportunities.

Blackstone River Valley National Heritage Corridor

Outside of the school system, BRVNHC is looking to have towns and cities add filtration structures to their catch basins and outfalls. The plan is to install these structures in catch basins where students have been sampling and where monitoring data already exists. Adult volunteer groups will then perform the monitoring at the newly treated locations to show how the filters are improving storm water quality. Samples will be analyzed for nitrate, phosphate, copper, hexavalent chromium, and turbidity. BRVNHC will pay for some of the filters, a colorimeter for analyzing samples, and will train the volunteer groups.

The BRVNHC also has the opportunity to introduce Volunteers-In-Parks (VIP), a National Park Service (NPS) program. This program was authorized by Public Law 91-357 enacted 1970. The primary purpose of the VIP program is to provide a vehicle through which the National Park Service can accept and utilize voluntary help and services from the public. The major objective

of the program is to utilize this voluntary help in such a way that is mutually beneficial to the National Park Service and the volunteer. Each year more than 120,000 volunteers donate over 4,000,000 hours of service in the U.S. national parks.

To utilize this program, a park VIP Program Manager position needs to be established, which could be an added role for a current position. The Program Manager then develops and operates a VIP program that fits the conditions and needs of the BRVNHC. In other parks this program has been utilized to maintain trails, to carry out resource management, and to provide education to park visitors. This program is currently in use at the Roger Williams Park Zoo in Providence.

For more information on the VIP program visit the NPS website at www.nps.gov/volunteer, call the BRVNHC's park ranger at (401) 762-0250 or email blac_interpretation@nps.gov.

4.2.4 Regional, State and National Resources

Adopt Your Watershed

As described in the public education and outreach section of this report, the USEPA has created this campaign to encourage citizens and groups to work at protecting and restoring surface and groundwater quality in their watershed. The networking and training resources available from this program can help educators, communities, or private citizens improve water quality and implement their local storm water program through education and participation.

Give Water a Hand

This is a national watershed education program of the University of Wisconsin Environmental Resources Center. Support for Give Water a Hand is provided by National Fish and Wildlife Foundation, the U.S. Department of Agriculture, CSREES and NRCS designed to involve young people in local environmental service projects (www.uwex.edu/erc/gwah/). The program provides guidance to students on how to complete an environmental service project and the basic information necessary to understand their watershed. Free guides are available on the internet, but printed copies require printing and shipping fees. The publications are the youth Action Guide (also in Spanish) and the teacher's Leader Guidebook.

Narragansett Bay Commission

NBC offers volunteers the opportunity to participate in clean-up projects along the Woonasquatucket River. During their last event 90 citizens worked at 4 locations to remove 400 tires, ten's of shopping carts, and enough debris to fill a 30-yard dumpster. In the past NBC has also funded storm drain stenciling project and the Environmental Monitoring for Public Access and Community Tracking (EMPACT) Project. EMPACT allows the community to access current information about water quality in the Narragansett Bay via the internet.

URI Watershed Watch Program

The University of Rhode Island Watershed Watch Program (URIWW) works with local governments, watershed, tribal, and other organizations to assess water quality by recruiting and training volunteers to become citizen scientists. They offer several training programs with their main focus on performing water quality monitoring. These programs provide training, equipment, supplies, and analytical services to volunteers who record measurements and observations of water quality indicators on a weekly basis. Individual programs are outlined below.

The Water Quality Monitoring Program is a statewide volunteer sampling program. Trained monitors collect weekly measurements to provide current information on the water quality of surface water resources. The program emphasizes watershed scale monitoring to demonstrate how the water quality of surface water is impacted by the activities in the lands and waters upstream. Water quality monitoring requires one to two midday hours per week during most of the monitoring season (late April to early November) and a boat, if necessary, to get to the monitoring location. No prior experience is required and URIWW provides classroom and field training, equipment, supplies, and analytical services. Monitoring includes measuring the water clarity, surface and deep-water temperature, dissolved oxygen, chlorophyll analysis, and additional lab analysis.

URIWW also offers three supplemental training programs as part of their water quality program. These can be done independently, but are commonly done in conjunction with water quality monitoring. The Shoreline Survey Training teaches participants to observe water quality, natural and constructed features, identify sources of pollution, and how to record observations on large scale maps and standardized data sheets while along a section of the shore. Following training volunteers complete a survey and report results to the sponsoring organization approximately three times a year.

Aquatic Plant Identification and Mapping is a multi-session training course on identifying and mapping New England aquatic plants using field keys. Plant bed assessment and mapping are also taught. Aquatic plant monitoring is mainly performed in ponds, lakes, and reservoirs either annually or semi-annually during the mid to late summer.

Tributary Monitoring and Habitat Assessment is a multi-session training course on conducting intensive habitat assessments and monitoring of streams and rivers. Participants learn to observe water quality, natural and constructed stream features, identify various types of riparian habitats, measure stream flow, and how to record observations on maps and standardized field data sheets. This program follows the protocol established by the USEPA in Volunteer Stream Monitoring: A Methods Manual (USEPA 841-B-97-003). After the training, volunteers complete assessments and report observations, often in conjunction with water quality monitoring.

The cost of each of these trainings and the water quality monitoring program varies but is often covered by a sponsor. More information about the URIWW Program is available on their

website www.uri.edu/ce/wq/ww/html/ww.html. Interested individuals should contact either Linda Green, Program Director, at (401) 874-2905 or lgreen@uri.edu or Elizabeth Herron, Program Coordinator, at (401) 874-4552 or emh@uri.edu.

Roger Williams Park Zoo

The Roger Williams Park Zoo offers many community involvement programs for all ages. The ZooPower program is a highly successful *Youth* ALIVE (Achievement through Learning, Involvement, Volunteering and Education) program that recruits youth from Providence and Cranston public senior high schools. The participants, titled Student Activity Leaders (SALs) are trained as environmental educators. They are taught to research, develop and implement hands-on environmental curricula and are paid part time employees of the Zoo. These Junior Explorers teach six to twelve year olds enrolled in school-age childcare (SACC) programs around Rhode Island. ZooPower runs annually from October through June. A total of 14 Student Activity Leaders are divided into two teems of 7 which work Mondays and Wednesdays or Tuesdays and Thursdays from 3:30-7:00pm; all participants work Fridays from 3:30-5:30pm. All Student Activity Leaders must maintain a grade level of C or above in order to remain an active participant. In addition, they are eligible for a $5,000 continuing education scholarship upon completion of at least one year in program and graduation from high school. The Zoo also offers scouts the chance to earn badges/patches and adults can become involved with community Zoomobiles. In addition to schools the Zoomobile visits nursing homes, hospitals, and community centers. The Zoo's Education Department Program Registrar can be contacted at 401-785-3510 (ext.358), or send an e-mail to gdichiara@rwpzoo.org.

4.2.5 Local Media Resources

The local media can be a valuable asset to the City of Providence as part of their public education and outreach. There are several available resources for cable television and newspapers including:

The Providence Journal

The Providence Journal and affiliated website Projo.com, focuses on offering local and regional news, information, advertising and interactive opportunities for their Rhode Island audience. The Providence Journal has regional offices to address local issues. The applicable bureau for the City of Providence is the Metro office.

The Provide Journal headquarters are located at 75 Fountain St., Providence, RI 02902. For information on the Metro Bureau contact Jack Khorey, metro editor at the Metro office at 401-277-7303 or via email at pjmetro@projo.com.

City of Providence Municipal Web Page – www.providenceri.com

The City of Providence created the web page to better serve their citizens. The website contains information on the City government and council, meeting dates, times and agendas, the City

calendar, messages from City officials, contact information for City officials, and other electronic links that Providence residents may find helpful. The Department of Public Works' website at http://www.providenceri.com/publicworks/index.html posts environmental enforcement and illegal dumping hotlines as well as information about waste pick-up and recycling. Both websites could be an easy and cost efficient way to notify the public about new City programs and, additionally, as a vehicle to educate the public about local clean ups, this storm water pollution prevention plan and its recommended educational topics.

Rhode Island Statewide Interconnect

In the Cox Communications service areas in Rhode Island, you can watch Interconnect on Channel 13 (Channel A), 14 (Channel B) and 23 (Interconnect C). Interconnect C is assigned programming from governmental, municipal and academic producers and institutions around the state. It also carries live programming from the Rhode Island Statehouse, produced through Capitol TV. Interconnect B carries religious programming from around Rhode Island. Interconnect A is programmed with public access programs, and those that do not fall into the B and C designations. Information about statewide interconnect can be found at http://www.patv18.com/interconnect.html or by contacting Cox Communications at (401) 383-7088 or Steve Martin, RI DPUC, at (401) 941-4500, ext. 131

Cox 3, Cox Connection, and the RI News Channel (Cox Communications channels 3 – 5)

These three cable channels are available for local broadcast and to provide information to Providence residents.

Cox Communications Community Bulletin Boards

Community groups in the areas served by Cox Communications have the opportunity to promote non-profit, community events and services through PATV18's Community Bulletin Boards. Cox Communications' staff updates some of the Community Bulletin Boards; others are maintained by municipal employees in areas where equipment was donated to the towns and cities. The Providence Studio at 50 Houghton Street covers the City of Providence. For more information on this studio contact Lee Anne Varner or Rebecca Wetmore by phone at (401) 383-2051 or by fax at (401) 383-7175.

4.3 Implementation Alternatives

To comply with this control measure, the City must, at a minimum, conduct a public hearing on the City's Phase II program to allow citizens an opportunity to provide input on the program that is ultimately implemented by the City. However, it is recommended that the City expand its public participation program to take advantage of the intellectual and labor resources of its citizens. Potential alternatives are as follows:

- Create a Phase II Storm Water Committee addressing the public education/outreach component of the program. The group should include member(s) from ASRI, NRICD,

WRWC, and the City's Planning Board. This committee could assist the City with recruiting and coordinating resources, like Save the Bay, to implement recommended measures.

- Adopt a storm drain stenciling program with the help of scouts, students, businesses, and residents. Businesses may stencil their own catch basins or those located in their business district. Use Save the Bay and Blackstone River Watershed Council's experience and organizational skills to ensure a more effective effort. A limited amount of storm drain stenciling may have already occurred in Providence.

- Coordinate with URI Watershed Watch, Moshassuck Monitors, WRWC, Providence High School Chemistry classes and any other groups on water quality sampling projects. An effective way to employ the program would be to initially screen storm water outfalls with dry weather discharges as part of the illicit discharge detection program.

- Coordinate with local Boy and Girl Scout organizations to discuss potential resources that they could contribute to the program (i.e. flyer distribution, storm drain stenciling).

- Inform local Girl Scout troops about the Water Drop Patch. Provide them with the information found herein and encourage them to participate as a means to foster environmental stewardship in Providence. This program would not only benefit the scouts but also would provide an avenue for a broader public education, as the scouts become watershed and wetland stewards. The Boy Scouts could also be encouraged to utilize their conservation "Good Turn" program in the Providence area.

- Coordinate with existing regional organizations to discuss enhancing their recruiting efforts and targeting specific storm water related issues in Providence.

- Utilize volunteers from the community and local organizations for simple tasks that would improve water quality as well as raise the public's awareness. Public participation will enhance the public education component of the storm water program with the following tasks:

    - Stencil or otherwise mark catch basins with informational phrases such as, "NO DUMPING, DRAINS TO RIVER." Save the Bay has experience participating in this type of activity.
    - Assist with installing and operating kiosks.
    - Identify outfalls to City waters.
    - Clean-ups along recreational waters. The WRWC, ASRI, NBC, and scouting troops all have experience in organizing and participating in these activities. Track the amount of materials retrieved during the clean up.
    - Create local speakers panel to discuss the City's storm water program and pollution prevention with targeted residents and businesses. Broadcast the discussions over a local cable station. The City should consider contacting URI

for possible speakers. The City officials could be utilized for these speaking opportunities. Below are some sample speaking opportunities:

- Water in my Community: Drinking water, Storm water, and Sewage – DPW
- Municipal Government and Storm Water – City Planner
- Municipal Government and Illicit Discharge Detection – City Engineer
- BMPs in your Community: Form and Function – City Engineer
- Preventing Soil Erosion – City Engineer
- Proper Landscaping Practices – Parks & Recreation Dept.
- Sound Tree and Shrub Management – Tree Warden

Specific tasks that could be completed as part of the public participation program include:

- Establish "neighborhood watershed" groups to encourage protection of surface waters and report spills and illegal dumping to a DPW hotline.

- Inventory storm water outfalls within the first year of this plan. This activity could be linked with WRWC, BRVNHC, and ASRI who sponsor recreational outings such as biking, canoeing and kayaking.

- Sponsor or co-sponsor biannual cleanup projects that allow businesses, scouts, schools, volunteer organizations, and residents to get involved. Provide incentives to businesses by providing them with stickers or plaques to display at their businesses. Efforts should be initially targeted at publicly assessable streams that receive road runoff from Providence and then expanded citywide.

- Establish partnerships with local businesses or community groups to remove litter from portions of streets and watercourses.

- Recruit volunteer educators to speak to business and industry owners through workshops. Local professionals may wish to contribute their time or resources for this task. URI may be contacted for possible speakers.

- Recruit local high school students to serve as environmental stewards for younger students. Coordinate with local community service programs and offer incentives to volunteers such as media recognition or trips to environmental science fairs.

- Contact the Roger Williams Park Zoo in regards to their many environmental service projects and lecture series. Perhaps they would be willing to provide lectures on the impacts of storm water pollution on animals. They may also be willing to incorporate this into their Zoomobile lessons or as part of their ZooPower Program. The City should consider starting a summer program to employ a few high school students during the summer months if utilizing the Zoo's program is not possible.

- Conduct public meetings annually to present the City's annual report required by the permit. The annual report should also be posted on Providence's website and printed in City newsletters or local newspapers.

5.0 ILLICIT DISCHARGE DETECTION AND ELIMINATION

The City is required to develop and implement a plan to detect and eliminate illicit discharges to its MS4, including development of a storm sewer outfall map showing the location of all outfalls and the names and location of all waters of the United States that receive discharges from those outfalls. The potential for illicit discharges remains with illegal connections that are often the result of failing septic systems and/or industrial discharge. The following sections detail the regulatory requirements for this effort, the City's existing programs and controls to meet these requirements, and recommended measures for the City to become fully compliant with these regulatory requirements.

5.1 State and Federal Regulatory Requirements

Commonly, municipal separate storm sewer system (MS4) discharges include wastes and other wastewaters from non-storm water sources that can significantly impact water quality. Sanitary sewage, process wastewater, floor drains and other wastewaters have been documented in MS4 systems. A common impact is elevated levels of bacteria and pathogens as a result of improper sanitary connections. Because of these water quality impacts, these discharges must either be permitted or removed and connected to the municipal sanitary sewer system for treatment at a wastewater treatment plant. These non-storm water discharges are often more common in older storm sewer systems due to less awareness and enforcement in the past when these connections were made.

National Pollution Discharge Elimination System (NPDES) Phase II Storm Water Regulations define these discharges as "illicit discharges," which are further defined in Rule 31(b) Definitions as:

"Illicit discharge means any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges from fire fighting activities."

Specific requirements of this program consist of the following:

1. Develop, if not already completed, a storm sewer system map showing the location of all outfalls and the names and location of all waters of the United States that receive discharges from those outfalls.

2. To the extent allowable under State, Tribal or local law, effectively prohibit, through ordinance, or other regulatory mechanism, non-storm water discharges into your storm sewer system and implement appropriate enforcement procedures and actions.

3. Develop and implement a plan to detect and address non-storm water discharges into your storm sewer system and implement appropriate enforcement procedures and actions.

4. Inform public employees, businesses and the general public of hazards associated with illegal discharges and improper disposal of waste.

Table 5.1 provides examples of sources of common illicit discharges.

TABLE 5.1
EXAMPLES OF SOURCES OF ILLICIT DISCHARGES

Sanitary Wastes
Improper Oil Disposal
Radiator Flushing
Laundry Wastewaters
Automobile and Household Hazardous Wastes

The USEPA regulations allow several categories of non-storm water discharges to an MS4 if they are not identified as significant contributors of pollutants in the system. Table 5.2 lists allowable non-storm water discharges, provided they do not adversely impact water quality.

TABLE 5.2
ALLOWABLE NON-STORM WATER DISCHARGES

Water Line Flushing
Landscape Irrigation
Diverted Stream Flows
Rising Ground Waters
Uncontaminated Ground Water Infiltration
Uncontaminated Pumped Groundwater
Discharges from Potable Water Sources
Foundation Drains
Air Conditioning Condensation
Irrigation Water
Springs
Water from Crawl Space Sumps
Footing Drains
Lawn Watering
Individual Residential Car Washing
Flows from Riparian Habitats and Wetlands
Dechlorinated Swimming Pool Discharges
Street Wash Water Discharges
Flows from Fire Fighting Activities

With the exception of discharges listed above, current NPDES regulations prohibit non-storm water discharges to a storm sewer system without specific authorization from USEPA in the

form of a NPDES permit. This is addressed in Rule 8 of the United States Environmental Protection Agency (USEPA) NPDES regulations that prohibit any discharge of pollutants without a permit.

5.2 Mapping

It is understood that the City of Providence has limited existing mapping of storm sewer drainage system within the City. In order to comply with the requirements of the Phase II storm water program, additional efforts will be required to identify all outfalls to waters of the United States. A recommended program to collect information on these outfalls and evaluate the potential for illicit discharges is provided in Section 5.4.

This element of the storm water management plan will likely be the most intensive component of the plan. As a result, it is recommended that the City utilize a public participation program in an effort to minimize the costs to implement the program. In addition, it is recommended that the City prioritize its efforts to waters of the state that have known water quality impacts that may be caused by illicit discharges. These waters are identified in the State of Rhode Island 303(d) list.

5.3 Municipal Regulations

The City currently has a municipal ordinance that prohibits non-storm water discharges to watercourses or the City's MS4. Following a review of the City's existing ordinances, the following sections of the City's ordinances have been identified as regulating or otherwise controlling unauthorized discharges to the City's MS4 and regulated water bodies.

Providence Ordinances

§ 25-73 Building and Sewer Connections

- Part A of this section requires that all sewer work must be done only after obtaining appropriate permits from the City.
- Part D of this section lists the application requirements for permits to perform work on sewers within the City limits as well as costs for the permits and inspections.

§ 25-74 Construction Requirements for Public Sewers and Drains

- Part A (1) of this section requires that waste water from a property connecting to a sewer shall not be discharged through groundwater to receiving waters.

§ 25-75 Use of Public Sewers

- Part A (2) requires that all unpolluted waters must be discharged to drains specifically designated as storm drains or combined sewers. And that any industrial cooling water may only be discharged only after all reasonable attempts have been taken to reduce the temperature and any pollutants associated with the water.

- Part B requires that all commercial or industrial businesses discharging to a storm drain must apply for a permit from the RIDEM and the USEPA. All applications must be in conformance with NPDES requirements.

§ 25-79 Certain Persons Authorized to Construct and Repair Sewers and Drains

- Part D of this section requires that only authorized persons may are permitted to construct sewers to ensure compliance with the other sections of this article. Part F of this section lists all authorized persons.

§ 25-80 Offenses Enumerated

- Part D of this section requires that if any sewer repair, construction or connection is preformed in violation of any of the sewer related ordinances, the director may order those who preformed the work to uncover any pipes to afford the director an opportunity to inspect the work.

§ 12-57 Littering

- Part A of this section requires that the no person may dump, deposit, drop, throw, or leave any litter on public or private property in the City including any body of water.

§ 12-80 Penalties for Littering Violations

- This section lists the fines required for different littering offences.

<u>Providence Application for Private Drains</u>

A permit is needed for opening storm drains, and all connections to the storm drain. Only authorized drain-layers, licensed by the Director of Public Works may apply for a permit and perform work on the storm drains and all work may be inspected by the Director of Public Works at any time.

5.4 Implementation Alternatives

The following recommendations have been developed for the City to fulfill the requirements under the Phase II storm water program.

5.4.1 Mapping

A plan has been developed for the City to develop mapping to satisfy the following requirement under the Phase II program:

Develop, if not already completed, a storm sewer system map showing the location of all outfalls and the names and location of all waters of the United States that receive discharges from those outfalls.

This plan includes a program to compile a map of existing storm sewer outfalls in Providence based on existing municipal mapping and its ongoing geographic information system (GIS) project. This program includes the following elements:

- Review existing municipal records, drainage mapping, storm drain mapping, aerial photography, orthophotos, the City's GIS system, and field surveys to identify known outfall locations. This information will be supplemented with interviews with municipal DPW staff to identify outfall locations. These locations will be shown schematically on a GIS base map in order to provide general locations to the engineer for outfall inspections.
- During the effort to inspect outfalls, the outfall will be located by geographic positioning system (GPS) or traditional survey. This location will be recorded in a format compatible with the City's GIS system in order to develop a Storm Water Outfall data layer.

5.4.2 Municipal Regulations

A proposed amendment to the City's ordinance has been identified to satisfy the following requirement under the Phase II program:

To the extent allowable under State, Tribal or local law, effectively prohibit, through ordinance, or other regulatory mechanism, non-storm water discharges into your storm sewer system and implement appropriate enforcement procedures and actions.

This draft model ordinance has been prepared by the New England Interstate Water Pollution Control Commission (NEIWPCC) for adoption by communities to meet the requirements of this program element. This ordinance is provided as Appendix B at the end of this report. Additional model ordinances prepared for the elimination of illicit discharges have been identified and are provided in Appendix C for the Town's consideration.

5.4.3 Illicit Discharge Detection and Elimination

A proposed strategy has been developed to satisfy the following requirement under the Phase II program:

Develop and implement a plan to detect and address non-storm water discharges into your storm sewer system and implement appropriate enforcement procedures and actions.

At least initially, it is recommended that the goal of this program not necessarily be to detect all illicit discharges to the MS4, but instead to focus on identifying the discharges that may actually impact water quality of receiving waters throughout the state. For example, this program is focused on eliminating illicit discharges that are actually observed to be discharged to waters of the state as opposed to all discharges that may evaporate or infiltrate prior to being discharged from the MS4.

The development of the storm sewer map as outlined in this plan will complete the initial step to detect non-storm water discharges by locating outfalls where there is a dry weather flow component. While dry weather flow could be groundwater infiltrating into the storm sewer, it is also potentially indicative of an illicit discharge. Once this initial step is completed, the following steps are recommended to first determine whether the observed flow is from an illicit discharge and, if so, to identify the source of the discharge.

- Inspect each outfall location (subject to the City's ability to arrange for or provide access across private property as required) to document the following information on an outfall inspection report:
    - Observed dry weather flow (a digital photograph will be taken of each outfall),
    - Outfall size, material and condition,
    - Approximate height of outfall above receiving watercourse,
    - Outfall receiving watercourse,
    - Coordinate location as determined by GPS,
    - Any additional outfalls observed during the outfall inspections, and
    - Any other observations of the outfall and/or surrounding area (odor, turbidity, color, site conditions).

- To the extent possible, at least 72 hours of dry weather should precede any fieldwork associated with this program. These inspections should occur during dry weather such that stream height will be lower to expose submerged outfalls as well as to better observe dry weather flows from outfalls that may be indicative of an illicit discharge.

- In addition, each outfall will be numbered uniquely such that its data can be correlated with a location on the storm sewer base mapping to be developed. All collected data will be organized and reviewed by the person responsible for implementing this element of the program.

- Collect samples to be analyzed for pH, temperature, specific conductivity, ammonia, surfactants and fecal coliform from outfalls where dry weather flow is observed. A total of five dry weather discharges will be sampled under the initial phase of this program. If the results of these analyses indicate that a potential illicit discharge exists, the upgradient drainage system will be examined to identify the extent of the system where that dry weather flow exists. A total of two outfalls will be investigated in this a manner during the initial phase of this program. During these investigations, the following information will be collected on upstream structures:

    - Condition of the structure (including a digital photograph),
    - Pipe sizes, and
    - Specific conductivity of the flow as measured in the field.

An outfall inspection report will be prepared to document the results of the investigations. This report will include the following:

- A cost estimate and work plan to further identify the source(s) of the dry weather flow observed, and
- An opinion of construction cost to correct the anticipated problems.

In those outfalls identified as having a potential illicit discharge, the City must identify sources of that discharge(s). The recommended approach to accomplish this task follows.

1. Delineate the drainage area of each outfall with a dry weather flow component to determine the extent of potential sources. This could be done by two methods.

    - Utilize TV inspection to identify sources of the dry weather flows. This inspection could identify the extent of the system where there is a dry weather flow component and identify connections to the storm sewer that are contributing dry weather flow.

    - Inspect the drainage system, structure by structure, to determine the extent of the system where there is a dry weather flow component. At this time, the system and its connections where a dry weather flow component was observed, should be mapped, or sketched a minimum. This should be the first task completed as it will limit the extent of the investigation.

2. Inventory the drainage area of each outfall of concern to evaluate the locations of potential pollutant sources. This will consist of reviewing land use and street maps to identify potential pollutant sources in the drainage area. In addition, water quality data from the outfall of concern should be reviewed to determine what the potential sources may be.

3. Conduct additional "targeted" wet or dry weather sampling at selected locations down-gradient of suspected pollutant sources to "bracket" sources of pollutants in the system. Sampling should include flow metering such that loads of pollutants of concern can be

calculated and to minimize potential interferences from clean groundwater diluting the illicit discharge. Based on experience with past projects, this effort will also be able to specifically identify sources. Parameters monitored should be consistent with parameters observed in the discharge.

4. Conduct detailed field inventory. Field inventories should be performed on foot and via windshield surveys, beginning at the point discharge, and following the bracketed drainage system up-gradient. The purpose of the field inventories is to further define what the potential source(s) may be.

5. Conduct a site investigation for each suspected source. This can be completed via one of several methods to specifically identify a source. This can include the following methods:

    - TV inspection to find a specific connection that is contributing dry weather flow. In high groundwater conditions, this method will be less useful. Also, it may be difficult to pin point a specific source in densely developed areas.

    - Smoke testing could also be used to identify illicit connections. Neighborhoods would need to be warned prior to use of smoke testing in their area. Also, this method may not be effective if the illicit discharges are flowing full or are equipped with traps.

    - Dye testing would pinpoint a specific discharge. This would require access into buildings and inserting dye at all potential illicit discharges which will require the field staff to be thorough. Permission would be required to enter businesses.

6. Eliminate the illicit discharge once found.

7. Confirm elimination of illicit discharges by collecting appropriate confirmation samples. This could either be done at the outfall or just downstream of the eliminated discharge.

At least initially, it is recommended that the goal of this program not necessarily be to detect all illicit discharges to the MS4, but instead to focus on identifying the discharges that may actually impact water quality of receiving waters throughout the state. For example, this program is focused on eliminating illicit discharges that are actually observed to be discharged to waters of the state as opposed to all discharges that may evaporate or infiltrate prior to being discharged from the MS4.

Throughout the implementation of the above program, efforts will be made to maximize public participation. Depending on the success of the public participation program, interested citizens could provide a significant amount of labor to complete the fieldwork necessary to implement these program components. Public participation in this program will require organization and training of the volunteers to ensure the quality of work is adequate and defensible for any future corrective actions.

Outfalls where access could be hazardous or would require access onto private property will be investigated by City or other contract employees and not members of the public. The City of Providence should identify the person or persons who will be responsible for implementing this program and any resources that will be available for this purpose. Assigned staff should receive appropriate training that includes Occupational Safety and Health Administration (OSHA) health and safety training as well as confined space entry training.

5.4.4 Public Education

This following requirement under the Phase II program is addressed in the public education best management practice recommendations.

Inform public employees, businesses and the general public of hazards associated with illegal discharges and improper disposal of waste.

6.0 CONSTRUCTION SITE RUNOFF CONTROL

6.1 State and Federal Regulatory Requirements

Typical construction activities have significant potential to impact surface water quality in the State by creating the potential for sediment, construction materials, waste and other pollutants to be transported to surface waters by wind or storm water runoff. As a result, the USEPA promulgated construction site runoff control regulations as part of its Phase I Storm Water permitting program. This program focused on projects that disturb more than five (5) acres of land for the total project. As part of this program, these projects were required to secure a Rhode Island Pollutant Discharge Elimination System (RIPDES) permit and prepare a detailed Storm Water Pollution Prevention Plan (SWPPP) that specifies soil erosion and sediment control as well as waste and product management practices to control potential impacts.

The Rhode Island Department of Environmental Management (RIDEM) currently regulates activities that disturb more than five (5) acres of land through the use of a general permit for the RIPDES program. This general permit requires submittal of a Notice of Intent (NOI) to RIDEM and the preparation of a SWPPP that must be certified by a registered professional, such as an engineer.

The Phase II program that has been promulgated by the USEPA requires regulated municipalities to develop, implement, and enforce a program to reduce pollutants in storm water runoff to small municipal storm sewer systems (MS4s) from construction projects that result in a land disturbance of greater than or equal to one (1) acre. Sites smaller than this would still require a permit if the land is part of a plan that alters a total area of greater than one (1) acre, such as a subdivision. Small construction projects are eligible for waivers of permit requirements if either:

1. The value of the rainfall erosivity factor, "R", is less than five (5) based on the revised Universal Soil Loss Equation (see below) during construction, or

2. A Total Maximum Daily Load (TMDL) establishes acceptable loads for pollutants of concern in impaired surface water or an equivalent analysis, which determines that allocations of pollutants of concern for the project are not necessary to maintain water quality.

The Universal Soil Loss Equation is as follows:

$$A = R \times K \times L \times S \times C \times P$$

Where:

A = Average annual soil loss (tons/acre/year)
R = Rainfall (erosivity) and runoff factor
K = Soil erodibility factor
L = Slope length

S = Steepness factor
C = Cover and management factor
P = Support practice factor

RIDEM or USEPA Region I office may designate small construction activities that disturb less than one (1) acre of land if the activity contributes to a violation of water quality standards, or for significant contribution of pollutants, such as Total Suspended Solids (TSS), to any surface water. Current RIPDES Phase II Storm Water Regulations only require regulation of one (1) acre or more of land development.

The specific state and federal requirements of the construction site runoff control minimum measures, which the City must develop and implement, are as follows:

1. An ordinance or other regulatory mechanism to require erosion and sediment controls, as well as sanctions to ensure compliance, to the extent allowable under state or local law;

2. Requirements for construction site operators to implement appropriate erosion and sediment control best management practices (BMPs);

3. Requirements for construction site operators to control construction wastes, such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary wastes at the construction site that may cause adverse impacts to water quality;

4. Procedures for site plan review, which incorporate consideration of potential water quality impacts;

5. Procedures for receipt and consideration of information submitted by the public; and

6. Procedures for site inspection and enforcement of control measures.

The Coastal Resources Management Council (CRMC) has regulatory authority of the area "extending from the territorial sea limit, three miles offshore, to two hundred feet inland from any coastal feature." In addition, natural and manmade coastal features and the area within two hundred feet from their inland borders are under the authority of the CRMC. Cultural features of historical or archaeological significance are also within the jurisdiction of the Council.

CRMC has accepted the *Rhode Island Erosion and Sediment Control Handbook* for construction site BMPs. Land development projects within CRMC jurisdiction must comply with project-type and project specific requirements established to prevent impacts to the features protected under CRMC regulations.

6.2 Existing Municipal Ordinances

The City has a limited number of enforceable regulations in place to address construction site runoff control. The regulations are written to address the specific issues associated with ultra-urban development and redevelopment in a historic city. As such, the impacts of development are primarily focused on aesthetics, appropriate use of land, and conformance with the City's Comprehensive Plan. However, the following paragraphs outline sections of the municipal codes that are relevant to the Phase II program.

6.2.1 Development Review Regulations

The City Plan Commission must review Land development projects on parcels of land having an area of at least 40,000 square feet and that are not subject to the review of the Capital Center Commission, Historic District Commission, or the Downcity District Review Committee. In the case of a subdivision, the City Plan Commission must review the plan. According to Sections 405 and 506 of these regulations, the submission requirements of application packages for proposed minor and major land development projects or subdivisions must contain:

> "…a drainage plan showing the measures to be taken to control erosion and sedimentation during and following the development and the measures planned to provide for the control of storm water runoff."

Although the soil erosion and sedimentation controls (SESCs) must be implemented, guidance regarding the preparation of a soil erosion and sedimentation plan, the general requirements of such a plan (i.e. drainage patterns, identification of water courses, etc.) and the maintenance and enforcement of these measures is not provided.

6.2.2 Zoning Ordinance

The City's Zoning Ordinance states that the ordinance is intended to provide for "the control, protection, and/or abatement of air, water, groundwater, and noise pollution, and soil erosion and sedimentation." Specific requirements and provisions detailing how the intended provisions can be met are not provided in the ordinance.

Section 421 requires approval by the City Plan Commission for land development projects on parcels of land having an area of at least 40,000 square feet. The required minimum contents of a plan submitted for review by the City Plan Commission for approval under this section do not include erosion and sediment control measures.

Section 802 requires a site plan to accompany an application for a Building Permit or Certificate of Occupancy to the Director of the Department of Inspections and Standards, but does not require erosion and sediment control measures.

6.2.3 Enforcement

A violation of any section of the City of Providence's Code of Ordinances may result in a fine of not more than $500 a day for each violation. This is enforceable by any board, agency, or person authorized by the City of Providence to administer this enforcement.

6.2.3.1 Development Review Regulations

The Administrative Officer, who is also the Director of the Department of Planning and Development, is responsible for the approval, rejection, and coordination of reviews of proposed subdivision and land development applications.

According to Section 605.2, the Director of Planning and Development (Administrative Officer) is responsible for coordinating inspections during construction and upon completion of the required improvements. The Administrative Officer is also responsible for coordinating enforcement of the regulations by the Director of the Department of Inspections and Standards and the Director of the Department of Public Works.

6.2.3.2 Zoning Ordinance

The Director of the Department of Inspections and Standards is responsible for the enforcement of the provisions of the Zoning Ordinance.

6.3 Implementation Alternatives

In order for the City of Providence to comply with USEPA Phase II regulations, the following items need to be addressed.

1. *An ordinance or other regulatory mechanism to require erosion and sediment controls, as well as sanctions to ensure compliance, to the extent allowable under State or local law.*

A model ordinance for SESC can be found in the *Rhode Island Soil Erosion and Sedimentation Control Handbook.* The model ordinance is organized into the following thirteen (13) sections:

- Section 1: Purpose. This section discusses the need for a citywide ordinance.
- Section 2: Applicability. This section identifies the situations in which the ordinance will apply.
- Section 3: Permit Required – Exceptions. This section identifies specific characteristics of a project that will exempt a development from the requirements specified in the ordinance such as project size, depth of excavation, proposed land slope, etc.

- Section 4: Provisions – Procedures. In general, this section discusses the process for plan submission, review and approval and includes five (5) subsections: (i) Plan; (ii) Fees; (iii) Plan Review; (iv) Plan Approval; and (v) Appeals.

- Section 5: Plan Contents. This section dictates the items to be included on the erosion and sedimentation plan and submission requirements (plan size, scale, number of copies, etc.).

- Section 6: Performance Bond. This section indicates the necessity of a performance bond for erosion and sedimentation controls involved with the development project.

- Section 7: Approval – Expiration – Renewal. Conditions for the expiration and renewal of the approval granted for erosion and sedimentation controls are specified in this section.

- Section 8: Maintenance of Measures. Information relating to the maintenance of temporary and permanent erosion and sedimentation controls is presented here.

- Section 9: Liability of Applicant. The owner/applicant is responsible for any damage to persons or property, regardless of the approval and compliance of the erosion and sedimentation control plan.

- Section 10: Periodic and Final Inspections. The development project is subject to periodic and final inspections by the building inspector or an authorized representative.

- Section 11: Non-compliance. If the approved erosion and sedimentation control activities are found to violate any portion of the ordinance, the building inspector's actions are specified here. These actions may include a written notice obligation, a cease and desist order, etc.

- Section 12: Penalties. This section details the situation in which the approval of the erosion and sedimentation plan may be revoked or suspended. This section also details other penalties that may be inflicted upon the owner/applicant.

- Section 13: Definitions. This section defines selected terms found throughout the ordinance.

We recommend that the City of Providence use the above outline to adopt an erosion and sedimentation control ordinance. Although this ordinance includes some provisions that meet the USEPA Phase II requirements, we recommend that the following items be integrated into an ordinance that will allow the City to fully comply with the Phase II requirements as well as assist in implementing the regulations.

- Section 3: Permits Required – Exceptions. Consider including as an exception any project that is not within a certain distance of the municipal storm sewer system. For

example, no permit will be required for a "…development project that does not occur within 100 feet of any storm drain inlet, watercourse, coastal feature, or surface water…"

- Consider requiring the submittal of a construction schedule approved by the Director of the Department of Inspections and Standards. This will assist the City in scheduling future inspections.

- Consider including an emergency action plan for wet weather, spills, or BMP failure, especially locations that would be sensitive to a failure, such as an area adjacent to a surface water or storm drainage system.

2. Requirements for construction site operators to implement appropriate erosion and sediment control best management practices (BMPs).

Section 5 of the model ordinance specifies several non-structural measures that must be implemented in the erosion and sedimentation control plan that is submitted to the City. These measures include avoiding the creation of slopes greater than 10%, the use of retaining walls and vegetative matting when warranted, and the retention of trees and/or existing vegetation whenever possible. We recommend including the following items to provide a more comprehensive ordinance:

- Require planning, design and installation of structural BMPs as outlined in the Rhode Island Erosion and Sedimentation Control Handbook. This will help to establish requirements that are consistent with the remainder of the State of Rhode Island and are especially important considering that most earthwork contractors work in multiple municipalities.

- Consider incorporating other BMPs, if desired, into the performance principles that are not currently addressed. Examples of these BMPs include restrictions on the time period during which unprotected soil conditions may exist due to inactivity on a portion of the site as well as BMPs for dewatering operations. The City may also want to consider whether there are any BMPs that would be disallowed.

- Consider incorporating BMPs for to control wind erosion from construction sites. Sediment deposition by wind erosion is another way pollutants contribute to air pollution and impacts to the City's surface waters either directly or via the storm sewer system.

3. Requirements for construction site operators to control construction wastes, such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary wastes at the construction site that may cause adverse impacts to water quality.

The model ordinance does not address the management of construction wastes. As a result, we recommend the addition of the following items:

- Require erosion and sediment control plans to include provisions for controlling construction wastes, such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary wastes at the construction site that may cause adverse impacts to water quality. These controls should be described in the project narrative and site plan.

- Consider including additional provisions for disposal of clearing/grubbing wastes such as stumps and asphalt that are often disposed of on-site.

- Consider including the disposal of materials that result from re-development projects. Saw-cutting waste and demolished building materials also should be addressed.

4. Procedures for site plan review, which incorporate consideration of potential water quality impacts.

The current building permit/certificate of occupancy, subdivision and site plan review processes include review of erosion and sedimentation control plans for major land development projects. The following items are recommended to assist with the review process:

- Confirm that all personnel responsible for reviewing the site plans to determine compliance with the newly adopted soil erosion and sediment control ordinance are adequately trained for such practices and allowable exemptions.

- Ensure that the land disturbance area requiring erosion control review is equal to or greater than the threshold cited in the newly created ordinance. It should also be determined whether the project is exempt from a permit or erosion controls based on criteria established in the ordinance.

- Provide contractors with self-inspection reports forms with final plan approval. This strategy may promote contractor compliance and enable inspection officials to gauge the level of understanding of the design plan requirements and Town regulations. An example of a contractor self-inspection report has been provided in Appendix I.

- Develop a checklist to ensure reviewers that minimum application requirements are met and BMPs are used appropriately.

5. Procedures for receipt and consideration of information submitted by the public.

The existing *Development Review Regulations* require public notice and a public hearing for major land development projects and major or minor subdivisions where a street is proposed to be extended or created. The public has access to all proceedings of the review board and allowed to present oral and written comments related to the proposed project. The following recommendations are proposed to formalize this process as stipulated in the USEPA guidance documents.

- Provide a form at the Building Inspector's office to document public inquiries and comments for construction projects. Consider providing an internet-based method of communicating public comment such as e-mail or an editable website document.

- Adopt procedures to respond or address public inquiries or concerns once submitted to the Building Inspector. It is not USEPA's intention that the City of Providence should develop a burdensome process to respond to every public inquiry. The Building Inspector may log complaints and direct them to the inspector responsible for a particular site. The inspector may prioritize inquires based on the severity of the suspected violation and investigate accordingly.

6. Procedures for site inspection and enforcement of control measures.

The model ordinance specifies that periodic inspections be to be conducted by the building inspector. Additionally, the building inspector will conduct a final inspection of the site and prepare a summary report at which time the owner/applicant may request the release of the performance bond. We recommend that the following items be implemented as part of the newly created ordinance to aid in the inspection process:

- Evaluate the need for additional staff to enforce the regulations and conduct appropriate inspections.

- Consider the use of summer interns to assist with a soil erosion and sedimentation control inspection program. After some initial training they could, at a minimum, assist City staff to determine whether controls have been installed and determine if sedimentation is occurring in down gradient surface waters.

- Review the possibility of existing building department staff conducting SESC inspections as part of their typical inspections that are currently done at building construction sites. While staff may not have sufficient time to conduct a thorough inspection, they can confirm that controls are in place and whether any downstream sedimentation or erosion is observed that could prompt a more thorough inspection by the City Engineer.

- Prioritize inspections based on the scale of the construction project, sensitivity of nearby water resources, an approved construction phasing schedule, or potential impacts as determined by the scope of the project in order to conserve the need for inspectors.

- Operators of construction projects should provide notice to the building official, or designated authority, at reasonable time in advance of the commencement of construction.

- Consider the development of an electronic database to track progress of construction, complaints and inspections. While adding some administrative commitment, this would also provide readily accessible documentation of compliance with the regulations.

While not specifically required in the regulations, some contractor training may be appropriate. This training would be valuable in communicating the need for SESC to contractors and what the minimum requirements are for both applications and construction. This could consist of the use of mailers and brochures that could be distributed to local contractors, developers, and engineers as well as more formal training. However, instead of the City shouldering the burden for a program that would actually benefit the region, we would recommend that the State of Rhode Island or other regional agency, consider developing this program.

7.0 POST-CONSTRUCTION SITE RUNOFF CONTROL

7.1 State and Federal Regulatory Requirements

New development and redevelopment projects have significant potential to increase pollutant loadings to receiving surface waters. These pollutants include suspended solids, nutrients, organics, metals as well as physical impacts such as increases in temperature. The USEPA Phase I Storm Water permitting program did not specifically address the post-development impacts from land development that were not classified as "industrial activities," but the RIPDES general permit for storm water discharges associated with construction activities does include requirements for "post-construction storm water management" (Section IV.E.2.b). While requirements for post-construction management are not specifically detailed in the general permit, it does require that the SWPPP prepared for the site include "a description of measures that will be installed during the construction project to control pollutants in storm water discharges that will occur at the site after the construction operations have been completed." No specific standards or goals for these controls are specified in the general permit.

The USEPA's Phase II Storm Water management regulations require regulated municipalities to develop, implement, and enforce a program to address storm water runoff from new development and redevelopment projects that disturb one acre or more of land and discharge into the municipality's MS4. The program must ensure that controls are in place that would prevent or minimize water quality impacts. This program must include the following elements:

1. Develop and implement strategies, which include a combination of structural and/or non-structural best management practices (BMPs) appropriate for the community;

2. Use an ordinance or other regulatory mechanism to address post-construction runoff from new development and redevelopment projects to the extent allowable under State, Tribal or local law; and

3. Ensure adequate long-term operation and maintenance of BMPs.

The Coastal Resources Management Council (CRMC) has regulatory authority of the area "extending from the territorial sea limit, three miles offshore, to two hundred feet inland from any coastal feature." In addition, natural and manmade coastal features and the area within two hundred feet from their inland borders are under the authority of the CRMC. Cultural features of historical or archaeological significance are also within the jurisdiction of the Council.

CRMC has accepted the *Rhode Island Stormwater Design and Installation Standards Manual* for post-construction BMPs. Land development projects within CRMC jurisdiction must comply with project-type and project specific requirements established to prevent impacts to the features protected under CRMC regulations.

7.2 Existing Ordinances

7.2.1 Zoning Ordinance

The ordinance intends to provide for the "preservation and promotion of the urban forest, street tress, and open space." Post-construction controls are not specifically required in the ordinance, but there are several mechanisms that, while focused on visual or aesthetic impacts, may be modified to help control storm water runoff. The Zoning Ordinance requires the installation and maintenance of at least four (4) feet of landscaping in certain areas of a developed lot for the following districts: Downcity District, Main Street Commercial Overlay District, and Westminster Street Overlay District. This requirement is not likely to have a significant preventative effect on storm water pollution.

Additionally, driveways and parking lots in the Westminster Street Overlay District, as outlined in § 506.6(G), "are encouraged to be permeable, using such materials as brick, concrete pavers, 'grass-crete' and other similar permeable materials, but not gravel. Vegetative buffers shall be planted to treat runoff as it percolates into the soil." This is considered a non-structural best management practice to minimize storm water runoff and improve groundwater recharge.

7.2.2 Development Review Regulations

The *Development Review Regulations* require the following for the submittal of a major subdivision application package:

> "Two (2) copies of a drainage plan and calculations showing the measures to be taken to control erosion and sedimentation during and following the development and the measures planned to provide for the control of storm water runoff."

7.2.3 Water and Sewer Ordinance

The *Water and Sewer Ordinance* does not contain any information relating to the control of post-construction runoff.

7.2.4 Enforcement

A violation of any section of the City of Providence's Code of Ordinances may result in a fee of not more than $500 a day for each violation. This is enforceable by any board, agency, and person authorized by the City of Providence to administer this enforcement.

Development Review Regulations

The City Plan Commission requires a performance guarantee for public improvements that are not completed as part of any planned development project prior to final plan approval. The Commission may also require maintenance guarantees for a period of one year or longer if necessary, after the acceptance of the improvements.

According to Section 605.2, the Director of Planning and Development (Administrative Officer) is responsible for inspections during construction and upon completion of the required improvements. Violations may be issued for non-compliance with the terms of the approved plans or any action related to the sale of land in an unapproved subdivision or land development project.

7.3 Implementation Alternatives

In order to fully comply with the USEPA Phase II requirements, we recommend that the City of Providence create, as part of the soil erosion and sedimentation control ordinance, a guidance document that will serve as a reference and regulation for designers, contractors and landowners to control storm water runoff for new development and redevelopment projects. This can be done by adhering to the requirements set forth in the USEPA Phase II regulations.

An important component of economic growth in ultra-urban environments is the redevelopment of inactive properties. The City's storm water plan can be sensitive to the economics and unique physical constraints of redevelopment projects, but should require improvements to water quality from redevelopment sites through the implementation of BMPs. The following paragraphs summarize our recommendations to comply with the minimum requirements of this control measure.

1. Develop and implement strategies, which include a combination of structural and/or non-structural best management practices (BMPs) appropriate for the community.

The City currently has no regulatory mechanisms for evaluating the use of BMPs at developments. We recommend the following items to comply with this requirement.

- Require BMP designs based upon the Rhode Island Storm Water Design and Installation Standards Manual, dated 1993. We do not recommend that the City develop independent BMPs; consistency with statewide practices will improve implementation by engineers and developers. However, considering the range of BMPs that have been developed since this manual was prepared, it is also recommended that RIDEM update this manual. The update could address not only newer technologies such as sand filters and constructed wetlands, but also provide data on expected pollutant removal efficiencies. This will allow municipalities to better determine compliance with minimum pollutant removal requirements.

- Consider whether the City, based on past experience, should expressly prohibit any BMPs. While BMPS may be specified in the Rhode Island Storm Water Design and Installation Standards Manual, there are some controls such as infiltration trenches that, while commonly shown in BMP manuals, have limited application in the northeastern United States, especially in urban environments.

- Consider an alternative approach to addressing post-construction runoff that determines an appropriate level of controls based on the risk to water quality that a development poses. This would result in a lower level of controls for projects with greater risks. Appendix D includes one approach that was implemented in Waterford, Connecticut to innovatively control water quality impacts as well as costs of BMPs to developers. It outlines a matrix that defines three (3) escalating tiers of controls that are based on location of sensitive receiving waters, land use, percent imperviousness and size of development. If desired by the City, this approach should also be incorporated as part of a public participation program. This program should include both the regulated community as well as other stakeholders.

- Consider the use of alternative technologies to achieve reduced pollutant loads from new and redevelopment projects to the City's MS4 where traditional methods are not feasible due to the high urbanized environment.

2. *Use an ordinance or other regulatory mechanisms to address post-construction runoff from new development and redevelopment projects to the extent allowable under State, Tribal or local law.*

There are no existing regulations that address post-construction storm water quality issues. Regulations are needed in order to comply with Phase II requirements and should specify planning and design standards for BMPs (such as those currently in the *Rhode Island Storm Water Design and Installation Manual*) and long-term maintenance and monitoring. The following items are recommended to comply with this requirement.

- Create regulations that require BMPs for land development or redevelopment projects that disturb greater than one acre. As the subdivision and land development regulations apply to all land development and redevelopment projects in Providence, the newly created regulations should be focused on these regulations. Two mechanisms exist to create these regulations:

- Adopt the Model Storm Water control ordinance that is being developed by RIDEM. A copy of the draft ordinance is included in Appendix E. This would require incorporating a separate ordinance into the municipal code or it could be added to the current zoning by-laws or development regulations.

- Create a regulation that includes specific provisions to address storm water quality. This could be completed by incorporating specific sections of the RIDEM Model Storm Water Control Ordinance into the land development regulations. At a minimum, the following components of the model ordinance should be incorporated.

    i. Section 5-1.2: Performance Standards. An important component of this section is that an applicant must demonstrate that proposed controls remove at least 80% of the average annual TSS load in storm water runoff from the site.

ii. Section 5.4: Safety, Section 5.6: Nuisance Control and Section 5.7: Landscaping. The items discussed in these sections are often overlooked industry-wide.

iii. Section 5.5: Facilitation of Maintenance. These include requirements that will result in designs that will minimize maintenance.

iv. Section 6.0: Maintenance Requirements. These include minimum maintenance requirements that need to be specified for BMPs. More detailed maintenance requirements are addressed in this section of the report.

v. Section 7.3(A): Site Plan Calculations and Section 7.4: Narrative Description. These include the submittal of employed BMPs, described in detail, their effectiveness and maintenance in order to confirm that the selected BMPs will meet the intent of the Phase II regulations.

vi. Section 8: Maintenance Agreements and Section 9: Performance Surety. Maintenance is an important component of the long-term performance of any BMP. These two sections require regulated land development projects to enter into enforceable agreements to maintain their BMPs, with performance surety in place to ensure maintenance.

vii. Section 11: Enforcement. We recommend the incorporation of this section as it provides a clear mechanism for enforcement for non-reporting and maintenance issues.

- Implement regulatory modifications as part of a public participation program. At a minimum, this program will review proposed regulatory modifications with the public. However, the program can be expanded to form a committee of interested citizens, including other consulting engineers and developers, to develop final regulatory changes.

3. Ensure adequate long-term operation of BMPs.

Unless contained in project-specific conditions of local or RIDEM approval language, existing regulations do not include provisions to ensure adequate long-term operation of privately owned BMPs. As a result, we recommend that an ordinance contain the following items:

- Develop a standard, long-term inspection schedule that requires inspection of implemented BMPs by a registered professional engineer. A sample inspection checklist is provided in Appendix H and additional checklists for different types of BMPs may be obtained on the internet at http://www.stormwatercenter.net/. In sensitive areas, more frequent inspections and reporting may be warranted.

- Amend the Zoning Ordinance and Development Review Regulations to require long-term maintenance of all storm water facilities. An example of a post-construction model

ordinance is provided in Appendix F of this report to assist the City with developing appropriate language for establishing long-term maintenance and compliance through the use of maintenance agreements, record keeping, and inspections. This language should also include provisions for reimbursement to the City for O&M performed by City staff when the property owner defaults on these responsibilities.

- Consider development of an electronic database to track BMP maintenance, complaints and inspections. The administrative commitment could be part of that developed to track sites during construction and would also provide a readily accessible documentation of compliance with the regulations.

- Consider adding a post-construction reporting component for the public (e.g. internet-based, etc.) that is part of a plan to receive inquiries under the Construction Site minimum control measure. This could help the City in identifying non-compliance of BMP maintenance requirements and sources of potential pollution discharge into the City's MS4 or surface waters.

- Consider implementing a public education program dedicated to land developers and owners of commercial and industrial properties that addresses more detailed maintenance needs for specific BMPs. Suggested practices for specific BMPs are summarized in Appendix G of this report.

- Consider including requirements for long-term monitoring of BMPs, especially for sensitive land development projects. Influent and effluent grab samples could be collected from storm events that generate between 0.5 and 1.0 inch of rainfall during a 24-hour period. Before sampling, there should be at least a 72-hour period of no rainfall, and pre-treatment (influent) samples should be collected during the first flush of the storm. Runoff generated by the first half-inch or first inch of precipitation is typically considered the first flush. Post-treatment (effluent) samples should be collected after pre-treatment samples are collected with a delay in time equal to the time the water is detained in the treatment system during that storm. Initial and long-term post-construction monitoring of water quality controls is recommended.

  Initial Monitoring: Initial monitoring should be performed within one year following installation and initial startup of the control system to assess the system's design and short-term pollutant removal efficiency. Sampling of five separate storm events is recommended in order to make a statistically valid conclusion as to the effectiveness of the treatment system. The samples should be collected during early spring (April) and late summer (August) in order to examine seasonal variation of treatment performance. At least two storm events should be sampled during each season.

  Long-Term Monitoring: Biennial (i.e., once every two years) monitoring should be performed to provide information on the long-term pollutant removal efficiency and operation and maintenance of water quality controls for developments requiring secondary or tertiary controls. Biennial monitoring should be initiated following completion of the initial, first-year monitoring program.

The parameters that are recommended for initial and long-term monitoring are listed in Table 7.1 below. Discharge quality goals are also listed for each parameter. The ultimate goal would be for discharge quality to be non-toxic to aquatic life, however, this sampling does not account for stream dilution that would affect actual toxicity. At a minimum, it is recommended that storm water discharges achieve the listed quality goals that are achievable with proper storm water controls.

TABLE 7.1
BMP MONITORING PARAMETERS AND QUALITY GOALS

Parameter	Quality Goal
Oil & Grease	5 mg/l
BOD5	5 mg/l
COD	75 mg/l
Total Kjeldahl Nitrogen (TKN)	2.5 mg/l
Nitrate as Nitrogen	1.5 mg/l
Total Suspended Solids (TSS)	100 mg/l
Total Phosphorous	0.5 mg/l
Fecal Coliform	2000 /ml
pH	6 - 9

- Consider the use of agreements or deed language that requires private owners of projects for significant water quality impacts to properly maintain their BMPs. This language should also include provisions for reimbursement to the City for O&M performed by the City when the property owner defaults on these responsibilities.

4. Ensure controls are in place that would minimize water quality impacts.

Currently, there are no controls in place that would control water quality impacts. With the proposed additions to the City ordinances, specific requirements for these controls will be stipulated, thereby minimizing the opportunity for inappropriate controls to be implemented as part of a development or re-development project. However, the City's ability to ensure compliance with approved plans is limited based on available staff. We offer the following recommendations.

- Complete final inspection, including inspections of BMPs, prior to the Building Department's issuance of a Certificate of Occupancy. Submittal of as-built drawings to the City Engineer may be desired for projects with complex systems or that pose substantial risks to water quality.

- Prioritize sites of concern and include those sites in periodic inspections (e.g. once every two years) to ensure proper maintenance of implemented BMPs. As part of this, the City could also require specified projects to submit annual maintenance records.

- Successful implementation of these efforts would require staff time for both enforcement as well as record keeping. This, with the additional Phase II requirements, will likely exceed available staff time. The City could consider the use of a summer intern(s) to assist with this effort.

8.0 POLLUTION PREVENTION /GOOD HOUSEKEEPING

8.1 State and Federal Regulatory Requirements

The goal of this element of the storm water pollution prevention plan is twofold. The first is to minimize the pollutants that enter the Municipal Separate Storm Sewer System (MS4) prior to being discharged to surface waters of the state. This would consist of pollutants from land uses that drain to Providence's MS4 as well as those pollutants that are swept from municipally owned streets, parking lots, and facilities such as vehicle/fleet maintenance garages. The second goal is to minimize pollution caused by activities at municipal owned facilities such as storage of materials and wastes where they are exposed to precipitation.

The Phase II program that has been promulgated by RIDEM requires regulated municipalities to develop a pollution prevention/good housekeeping element that achieves the above referenced goals. This element largely consists of properly maintaining existing infrastructure such as roads and drainage structures as well as implementing appropriate pollution control practices at municipal facilities. Specific regulatory requirements for this element of the storm water pollution prevention plan are:

1. Develop and implement an operation and maintenance program with the goal of preventing or reducing pollutant runoff from municipal operations into the storm sewer system; and

2. Include employee training on incorporating pollution prevention/good housekeeping techniques into municipal operations such as landscaping, car and truck fleet maintenance, building and public works yard maintenance, new construction, land disturbances, and storm water system maintenance. Training materials available from the USEPA and RIDEM may be used to assist with this task.

The City of Providence currently implements a street and drainage system maintenance program with the goal of minimizing the pollutants that discharge from their MS4. Information regarding these current practices and responsibilities for pollution prevention and good housekeeping were obtained from questionnaires and phone interviews with staff from the Department of Public Works (DPW), Recreation, Parks, School, Fire, and Police Departments.

Providence's DPW consists of Highway, Sewer, Environmental, Engineering, and Administration Departments. The Highway Department oversees road and sidewalk maintenance including street sweeping. Their Fleet Division is responsible for vehicle maintenance in the DPW garages. The Sewer Departments performs regular catch basin maintenance, while the Engineering Department manages permitting. The Environmental Department is composed of enforcement and clean up divisions who respond to illegal dumping occurrences. The following summarizes the pollution prevention and good housekeeping techniques and policies employed by the City.

8.2 Department of Public Works

8.2.1 Public Street and Parking Lot Sweeping

The City of Providence has one of the most aggressive street sweeping programs in Rhode Island. Pavement sweeping is performed on approximately 730 curb miles or 2,095 streets six to eight times yearly. This includes most public streets and parking lots. As of October 6, 2002 crews have completed six passes of city streets. Sweeping is contracted out and typically begins in April and continues into November. The street sweepers cover the City by ward, starting in the south end where there is often more debris and sand from this area's hills. The initial spring effort uses six sweepers; the city then drops down to four sweepers until the final fall sweeping, which uses six again. Generally, in a given year, all streets receive the same number of passes unless an area is being used for a special event, in which case the neighborhood can request an extra pass. School parking lots are also swept as a courtesy if the schools request it. Daily logs including hours and locations have been maintained by the DPW for the last four to five years. Pavement deficiencies and necessary repairs are noted during sweeping.

Street sweeping is performed overnight between the hours of 10:30 PM and 7:00 AM. This coincides with Providence's general ban on overnight parking. A tentative schedule is posted in the Providence Journal at the beginning of the season. Each ward is given two days for each pass; however, sweeping may extend longer dependent on the amount of material that has built up in the roadways. The wards are asked to coordinate curb sweeping to the gutter line with this schedule. Sweeping information can also be obtained by calling the Public Works office. The Fire Department is responsible for semi-annual hydrant flushing and do not coordinate their schedule with the DPW. Sweepers will often use water from the hydrants to fill the trucks. There is no formal coordination between street sweeping and curbside waste pick-up. Pavement repairs are performed as they are reported, except during winter months when repairs are only done if repair material is available.

The existing contractor uses six Elgin sweepers that are all approximately one-year old. They are contracted to sweep public streets, playgrounds, and municipal parking lots. The existing contract does not call vacuum sweepers. A crew of city employees follows the sweepers with dump trucks to collect materials as the sweeper becomes full. There have been issues in the past with the contractor's quality of work. However, after requesting new bids the contractor purchased new machines and hired better drivers. The City owns three sweepers of which only one sweeper is used, primarily because of maintenance concerns. The sweeper they use to cover the downtown area for weekend nights is six years old. There are four trained sweeper operators that work nights and another six who work days. Providence started a program in 1995 to recycle the sediment collected by the sweepers at the Rhode Island Resource Recovery Corporation (RIRRC) facility in Johnston, Rhode Island known as the Central Landfill. The City purchased a Reed Screen-All to sift out paper and debris, so the landfill can use the sediment as cover. The debris is disposed of at Central Landfill. This saves both the City and RIRRC money because the City no longer pays for sediment disposal and RIRRC doesn't have to purchase cover materials. The quantity of sediment collected has not been tracked since it is no longer disposed.

8.2.2 Storm Water System Inspection and Cleaning

Providence's storm water sewer system is almost entirely its own. However, there is some interconnection with surrounding towns and cities. There are also areas where the city's storm water system is interconnected with the State's. For example a small portion of Cranston, including Parkside Circle, ties into Providence's MS4. Portions of Providence have combined sewer systems, which are owned and operated by the Narragansett Bay Commission (NBC). NBC is responsible for the sixty-one miles of sewer pipes and thirty-nine combined sewer overflows (CSOs) that service this area. Several clean water pump stations are associated with the sewer system and the water distribution system. These stations are not owned or operated by Providence.

There is no written program, but the storm water drainage system is checked for illegal connections when the traps are opened during catch basin cleaning. The City documents dry weather flow or obvious illicit discharges. The DPW will inform the homeowner or business by letter that they have detected an illicit discharge and that the property owner has a specified time frame (typically three days) within which to correct the problem before the connection will be plugged. If the dry weather flow appears to be sanitary waste the City will also report it to NBC.
If the discharge appears to be clean water without an obvious sanitary source the DPW staff will contact the Providence Water Supply Board about a possible water pipe leak. If there is a sewer leak into the city right-of-way, the DPW will repair the problem immediately. Any other problems with the City's sewers are also the responsibility of the DPW.

Construction work affecting the City's storm water drainage system often requires a permit from the Engineering Department. For example, in order to connect to Providence's MS4 or sanitary sewer system, a permit application form and site plan must be submitted. A street-opening/excavation permit must also be obtained from the Engineering Department. The applicant must notify the Department before backfilling so the site can be inspected to ensure connections are made properly. The Engineering Department also requires permits for dewatering procedures since the water is often pumped into the storm water system. The permit may require treatment, dependent upon the nature of the discharge. Work performed within utility right-of-ways must have access approved and be coordinated with the City.

According to the Sewer Department of the DPW, there are approximately 12,000 total catch basins tributary to the storm and combined sewer systems. Catch basins are cleaned using two truck-mounted buckets approximately once every two years, when calls are received from the public requesting maintenance, or when municipal staff observes flooding problems. Under normal conditions both trucks go out every day cycling through the City. One day of the week is set aside for "specials" or catch basins in low areas that have chronic problems. These areas are also inspected prior to known storm events to make sure they are clear of debris. Priority is given to inspecting and cleaning "specials" and to reported problems. The trucks were purchased in the 1980's and are operated by six trained employees. The depth of sediment is not tracked at any of the catch basins. There is currently no formal schedule for cleaning the City's catch basins, tide gates, or drainpipes. Even though there is no set schedule the city tracks when

catch basins were cleaned and continuously circulates its maintenance crews through the city. They also maintain a list of catch basins in low-lying areas that they try to inspect and clean regularly. The DPW has worked with Save the Bay on storm drain stenciling projects since 1996. There is an agreement with Save the Bay to have an annual stenciling event. The City disposes the sediment collected during catch basin cleaning at the Central Landfill. The total quantity of sediment and debris is tracked through disposal fees.

Storm drain outfalls and catch basins are not typically inspected for erosion nor do they receive preventive maintenance. The Sewer Department corrects problems as they are reported either by residents or by the crew cleaning the catch basin.

The Engineering Department keeps records and mapping of where storm sewer system structures are located. According to the Sewer Department of the DPW, there are 12,000 catch basins, 4,000 inlets, 20,0000 manholes, 32 tide gates, and 99 slots that they maintain in Providence. They do not maintain any of the detention ponds and vortex (swirl concentrators) structures located in the City. These structures are at major junctions in the storm water system and mostly receive storm water from the City but treat some run-off from state roads as well. Many of the detention ponds and vortex structures were constructed by RIDOT during state highway projects. RIDOT has plans to install more vortex structures as a part of several state road projects including the I-195 relocation. At this time, all structures constructed by RIDOT are maintained by RIDOT.

The State maintains storm water structures along state roads. The City has a list of which streets, delineated by intersection, are covered by RIDOT. Within Providence there is approximately 400 miles of city sewers and ten miles of state sewers. Providence does not coordinate daily catch basin cleaning with RIDOT; however, they will work with RIDOT to clear sewer lines where there are interconnections. The Sewer Department also inspects five river grates belonging to the State daily for required maintenance. There are thirty-nine Combined Sewer Overflows (CSOs) and portions of the sewer system in Providence that are operated and maintained by NBC. Maintenance efforts between the City, RIDOT, and NBC have been set since 1986 and are guided by lists but not reported between them. While there is no written program, a good working relationship has been established between all three.

8.2.3 Winter Road and Lot Maintenance

The City employs several deicing materials, which include sand, salt, and sand/salt mixtures. These are stored under cover at two depots. They are located on Terminal Road, in an enclosed structure, and Troy Street, under a bridge, in the City. Either the DPW or their contractors maintain most public city roads and parking lots during winter months. Areas are first plowed then treated with a 2:1 sand/salt mix as necessary. Pure salt only is directly applied to the streets in the extreme downtown area, such as Kennedy Plaza and City Hall. The spreaders are hydraulically fed and use speed-dependent applicators that are calibrated by the supervising mechanic. There are fifteen districts that are divided up between the drivers. The DPW decides when to begin deicing measures. Usually efforts start as soon as snowfall begins when temperatures are low or dropping. There is a written program in place for how DPW staff

deploys, which is dependent upon the storm. Steep roads, hospital and fire routes, main roads, and overpasses receive a heavier treatment; otherwise application of deicing materials is fairly consistent. The City will use one consistent application on all areas once and then return to the priority areas. Fewer materials are applied in flat areas like public parking lots. Excess snow removal and post snowmelt cleaning rarely occurs and is coordinated between a contractor and the Parks Department. Snow removal has not been implemented for several years and typically occurs in only the downtown area around Kennedy Plaza and City Hall. In recent efforts snow is simply pushed off to the side. The contractor would be responsible for depositing the snow in an upland area. RIPTA is responsible for clearing the bus turn-arounds within Kennedy Plaza. While the Parks Department coordinates snow removal, public parks are not used for snow storage.

Deicing materials go out to bid yearly and usually the lowest bid is accepted. The Board of Contractors decides based on the recommendations of either Director of Operations, the Director of the DPW, or the Highway Superintendent. MSD sheets for these materials are kept by the contractor and are not filed with the DPW. The City stores sand, salt, and mixes under cover and do not apply additives to the stockpiles. Alternative deicing materials are not used. The Finance Division maintains purchasing records (weight slips) to track the amount of material used.

8.2.4 Dumping and Solid Waste Removal and Handling

The City of Providence provides weekly curbside refuse and recycling collection to its residents. A contracted waste hauler collects all solid waste, yard waste, recycling, and white/bulky goods. The City does not collect hazardous waste (oil base paint, chemicals, pesticides, etc.). Solid wastes are not currently transferred or stored in Providence. The transfer station has been temporarily closed for security reasons. All wastes are now hauled directly to the Rhode Island Resource Recovery Corporation (RIRRC) facility in Johnston, Rhode Island known as the Central Landfill. Either the RIRRC or the contracted waste hauler and not the DPW would keep any tracked quantities. For more information about RIRRC, residents can call 401-942-1430 x775 or view their website at www.rirrc.org.

The Maximum Recycling Program allows residents recycle up to 40% of their trash. Since the RIRRC does not charge a fee to towns for their recyclables brought to Central Landfill, Providence saves money through recycling which can then be passed onto the resident. Recycling is made easy with bottles, cans, and cartons going in the Blue Bin while papers, thin cardboard and bagged textiles go in the Green Bin or paper bags. Newspapers are bundled and big items are set out loose. The city sends out mailings about the Max Recycling Program to its residents. These are typically sent out once or twice a year with other informational brochures such as the rodent removal program.

The contracted trash hauler provides a curbside yard waste collection program that allows residents to dispose of yard waste on their regular trash days. White goods (i.e., dryers, refrigerators, etc.) are collected on regularly scheduled collection days. Residents are allowed one large item including old furniture, chairs, stoves, etc per week. Missed pick-ups and

additional large items can be scheduled by calling 1-800-972-4545. White goods are recycled and yard waste is composted at Central Landfill. Information about the Providence's waste collection program and contact numbers are provided on the Public Works' Internet web page (http://www.providenceri.com/publicworks/).

The City's Environmental Department's enforcement and clean-up divisions are responsible for litter clean-up programs along city roads, while RIDOT and RIDEM coordinate efforts along state roads and in state parks, respectively. The Parks Department coordinates clean-up efforts in private and public lots. Litter is disposed of at Central Landfill. The DPW will coordinate waste disposal with local river groups and other volunteers during their clean-up efforts. The DPW will remove materials collected during the clean-up efforts. This was recently done in Olneyville as part of the Greenway Project.

Despite the many programs for easy waste disposal in Providence, there are several areas where dumping is a chronic problem. These areas include dead end streets, several areas parallel to Interstate 95, and near Old Atlantic Mill. Garbage, tires, white goods, and mattresses are all materials disposed of in these areas. Providence has installed signage and can impose fines to discourage dumping activities. Warrants were also issued at one point to scare chronic offenders. The Environmental Department's enforcement division is responsible for patrolling, reporting, and prosecuting those caught dumping illegally. The locations mentioned above are checked and cleaned by the Department's clean-up division regularly. They have established a hotline (941-3478) and will also respond to resident's complaints about dumping in other areas. The enforcement division includes four to six officers who can site offenders and a court liaison who provides appeal hearings. The USEPA has awarded the City of Providence for their efforts against dumping.

8.2.5 Hazardous Materials Handling and Storage

The DPW generates and controls a significant portion of the municipal hazardous waste generated in Providence due to the nature of facility operations, such as automotive fleet maintenance. The vehicle maintenance garages are largely used by the Fleet Division of the Highway Department and discussed in more detail in Section 8.3.1. Outside of the Highway Department, there is minimal use of hazardous materials or waste generation by the DPW. MSD sheets are available and maintained at the City's storage garage.

The City does not have a household hazardous materials collection program and residents are requested to contact RIRRC's Eco-Depot for information. Eco-Depot is a free service for Rhode Islanders who wish to dispose of their household hazardous waste safely and properly. The service is available by appointment only or by going to a Household Hazardous Waste Collection day. For a list of collection dates and other pertinent information including the types of waste Eco-Depot accepts, please view their website at www.rirrc.org/site/ecodepot/eco_main.asp. To request an appointment, please e-mail ecodepot@rirrc.org and for questions, please call 942-1430 x241. Providence residents can dispose of their used motor oil at the City's Oil Igloo. For information about disposing

hazardous waste, citizens can call the DPW at (401) 942-1430 ext. 775 or refer to the DPW's website at http://www.providenceri.com/publicworks/index.html.

8.2.6 Spill Response

The Fire Department is available to handle significant spills at the DPW's garages. Some materials, such as speedi-dry, are stored at the various facilities for incidental spills. Posters about spill prevention and clean-up are not currently displayed in the office or garage areas.

8.2.7 Personnel Training Program

There is no specific spill and storm water pollution prevention training for the mechanics or those working in the DPW garages. The City has recently hired someone to provide Right-to-Know Training. Posters are not currently displayed in the office or garage areas.

8.3 Highway Department – Fleet Division

The DPW has several facilities located throughout Providence. There are two adjacent garages located at 20 Ernest Street and a smaller 2-door garage located at 700 Allens Ave. The Highway Department's Fleet Division operates six or seven facilities as maintenance garages for DPW vehicles. The School, Parks, Recreation, Fire, and Police Departments all have their own garages or contract maintenance work out for their vehicles. 20 Ernest Street is one of the main facilities where vehicles and equipment is also stored. Maintenance and repairs of DPW vehicles are performed indoors.

8.3.1 Hazardous Materials Handling and Waste Disposal

New and waste automotive fluids are stored indoors in drums or closed containers. There is also an Oil Igloo outside the 20 Ernest Street facility for waste motor oil storage. The Oil Igloo is available to the public and serviced regularly by RIDEM. Other facilities store used oil in drums placed in a block secondary containment. There are no underground or outdoor above ground storage tanks at any of the facilities. Two solvent parts cleaners are used, one ach each of the 20 Ernest Street garages. The Fleet Division manages the automotive wastes at each garage and non-hazardous solid waste is brought to Central Landfill. Private contractors are responsible for the garages' hazardous wastes. Currently Western Oil removes the waste oil while Cycle Solve maintains the parts cleaners at the facilities. The DPW maintains monthly spreadsheets for their wastes and track materials brought to the landfill by tonnage. Please refer to Section 8.2.6 for spill response practices and Section 8.2.7 for more information about personnel training.

8.3.2 Floor Drains and Vehicle Washing

Reportedly, the garages have several floor drains that are suspected to discharge to the storm water system. Some of the garages are in areas serviced by the combined sewer. Employees at the garages have been instructed not to dump anything into the floor drains. At one time, posters were placed throughout the garages. Water associated with snowmelt, equipment, and floor and

vehicle washing are the only discharges allowed at the facility. Based on available information floor drain discharges are not directed through treatment structures and are believed to discharge to the street's sewer system. The DPW's vehicles are washed indoors at 20 Ernest Street and first go through a cold-water rinse, are cleaned with soap, and then rinsed a final time. The Fleet Division's staff regularly checks the floor drains. The Sewer Division routinely inspects and cleans the floor drains at each of the facilities approximately once every six weeks.

8.4 Recreation and Parks Departments

The Park and Recreation Departments maintains facilities throughout the City such as the Fleet Skating Center, Waterplace Park, McGrane Swimming Pool, Fox Point Water Park (Paul Cabral Complex), India Point Park, and the bike path. The Recreation Department sponsors, coordinates and conducts programs and/or activities for residents with an emphasis on neighborhood youths. The Department operates ten recreation centers, six municipal pool sites, and six neighborhood water parks throughout the City's several neighborhoods. These facilities are open year round with most centers operating seven days a week for various activities. With three passenger buses and ten fifteen-passenger vans, the Department's fleet is in full operation on a daily basis. There is a program to monitor all leagues and uses of the facilities. The Recreation Department requires a letter of request, application, proof of liability insurance, and permit fee before a facility can be used for organized activities. The floor drains at the Recreation Departments facilities are only found in the bathrooms and showers.

The Parks Department is responsible for maintaining many of the City's athletic fields, recreational open spaces, and North Burial Ground. The Recreation Department does not have a maintenance crew; therefore, the Parks Department maintains their fields. The School Department maintains Connelly Stadium and their own athletic fields. Equipment and minimal amounts of pesticide and landscaping products are stored at their Roger Williams Park facility. The maintenance garage at Roger Williams Park has floor drains with a solids removal system that connect to a leaching field behind the facility. At a minimum the floor drains are inspected and maintained as needed.

8.4.1 Cutting and Clearing

Cutting and clearing is performed by the City and not under contract. Lawn clippings are not collected from park grounds. Leaves and branches are raked and collected in a dump truck that brings them to a 30-yard roll-off at Roger Williams Park. These trimmings are disposed of at Central Landfill. Composting was considered but do to the amounts of litter (specifically broken glass) collected with the yard waste it was not feasible.

8.4.2 Fertilizer and Pesticide Application

The Grounds Crew of the Parks Department is responsible for fertilizer and pesticide application in city parks and athletic fields. However, in recent years very little to no material has been applied for financial reasons. Commercially available fertilizers and pesticides (i.e. Round-up) would be used and the City would probably hire a contractor to do the work. A

minimal amount of fertilizers and pesticides are kept in stock inside the Roger Williams Park facility.

Providence also maintains al large greenhouse at Roger Williams Park. The Director of Greenhouses, who is currently also the Supervisor of Inspection, oversees this facility. Both pesticides and fertilizers are used at the greenhouse. City personnel apply materials, but recently they have considered hiring a pesticide applicator. Pesticides are only applied inside the greenhouse and growing house, while fertilizers are used indoors and on the gardens and lawns surrounding the facility. The greenhouse crew uses a calendar to track applications and plan to implement an integrated pesticide program. Soil is not tested prior to application and there is no written program. Fertilizers and pesticides are stored separately in metal lockers indoors. The greenhouse crew is in the process of buying new metal lockers with containment designed for outdoor storage. Commercially available products are used and picked up as needed. The Director of Greenhouse oversees which products are bought.

8.4.3 Solid Waste Removal and Handling

The Parks Department's Grounds Crew regularly collects trash from containers located throughout public areas. Waste receptacles at Roger Williams Park are emptied every other day. One dump truck will go to each site and then the transfer the trash to thirty-yard roll-offs that can be brought to Central Landfill. The Park Department performs regular litter pick-up at sites throughout the City. There are also signs and programs in place to discourage littering. The Parks Department is also responsible for cleaning lots that have been neglected and pose a health hazard. The owner of the neglected lot is first sent a letter giving them 72 hours to clean their lot. If the issue is not addresses than the Parks Department will coordinate the lot's clean up.

8.4.4 Pet and Bird Waste

Section 4-27 of Providence's City Ordinance addresses canine waste and its removal. It states that the owner or person controlling the dog is responsible for disposing of any waste left by the dog in a public area. They must possess a means for disposing of the dog's waste on both private and public lands. This waste must be disposed of at a facility for human waste, a receptacle reserved for canine feces, or other appropriately designated location. Violating this law is punishable through fines ranging from ten to twenty five dollars depending on the number of prior violations. Providence also has a leash law prohibiting dogs from running freely on public lands. There is signage for both laws and Providence has made an effort to provide dog waste receptacles like those in place at the Extra Training Ground at the Cranston Street Armory. Residents still have a tendency to ignore this policy, which is not strongly enforced.

Providence has a constant problem with excessive geese populations. The City has looked into possible solutions but have yet to implement any. Several attempted solutions based on trying to scare away the geese, have only been briefly successful. Meshanticut Lake and Roger Williams Park have a chronic problem with ducks as well. Regulations against feeding the wildlife have been established and signage has been installed.

8.4.5 Pool Facility

The Recreation Department is responsible for Providence's six municipal swimming pools and six public water parks. Pool chemicals are stored in plastic tanks inside either the filter house or an adjacent building. At the end of the summer the pool water is discharged to the sanitary sewer system. Each pool is hard-piped directly to the sewer.

8.4.6 Tree Management

The Parks Department has a City Forester that oversees tree management in Providence. There are several programs in place to prevent tree destruction and promote planting on both public and private land. The City of Providence supports the Providence Neighborhood Planting Program (PNPP), which recently celebrated its 13-year history with the planting of its 5000th tree. The City has contributed an average of $50,000 per year towards PNPP's efforts. The City also relies on RIDOT to plant new trees during their construction projects.

8.4.7 Cemeteries

The Providence Parks Department has a small division responsible for maintaining the City's North Burial Ground. They will clear brush, cut grass, apply pesticides and fertilizers, plant grass, and perform other basic clean-up tasks. Yard waste is collected to create mulch and only brought to the Central Landfill when there is an over abundance of it. Herbicides are applied as needed to the grounds in areas where there are visible growth problems. The soil is not tested prior to application. Round-up was applied for the first time in 2002 and was used on older slate stones that were too fragile to have equipment near them. Approximately ten gallons of material was used throughout the year. Round-up was applied with a four gallon backpack sprayer with the applicant wearing appropriate safety equipment. Chemicals are stored indoors, either in a select area of the site's maintenance garage or basement vault. The North Burial Ground crew does not use an integrated pesticide program and the Director will instruct them verbally on application procedures. The Director of the North Burial Ground also decides on which products will be purchased and used.

Their office and maintenance building are located at the cemetery. The garage is primarily used for equipment and chemical storage, while some maintenance work is also provided here. Equipment includes several lawnmowers, dump trucks, and one backhoe. Vehicles are washed outside with car soap. Vehicle maintenance fluids and waste materials are stored indoors. Waste is disposed of in fifty-five gallon drums that the Grounds Crew will collect and have disposed with their waste. The garage does not have a parts cleaner. Floor drains in the garage have been sealed. The cemetery has two yard drains that are connected to the City's storm water sewer. However, they are not maintained and have not been functional in approximately ten years. Storm water adequately discharges from the site via overland flow.

8.4.8 Vehicle Maintenance

The Recreation Department does not operate a garage facility and since their vehicles are new they are mostly maintained at the dealerships under warrantee. Minor repairs may be conducted at DPW facilities. Each vehicle is stored at its designated facility or on site at the administrative offices. The Recreation Department does not have money in their budget set aside for vehicle washing so many of the employees wash them independently. Sometimes this is done outside at the Department's facilities; otherwise the person who uses the vehicle will take it to a car wash.

The Parks Department owns several lawnmowers and other landscaping equipment that it stores at its Roger Williams Park facility. There is a garage at this site for basic maintenance work. Any complicated maintenance, such as vehicle body repair, would be contracted out. Equipment is washed indoors with the power wash system and water drains to a leaching field through the facilities floor drain.

8.4.9 Spill Response

The Parks Department minimizes the risk of a spill by typically buying chemicals as needed and by contracting out work. The staff would alert Providence's Fire Department to respond to any spill incidents.

8.4.10 Personnel Training Program

Personnel training programs vary between the different crews and divisions of the Providence Parks Department. The Recreation Department does not have a training program geared towards pollution prevention.

8.5 School Department

The School Department operates separately from the rest of the City and takes care of most of its own maintenance needs through its contract with Marriot/Sedexho (M/S). M/S is responsible for custodial work at the schools and Connelly Stadium, grounds maintenance, performing roof or boilers repairs, and oil delivery. Floor drains, roof drains, and catch basins can be found on school property. The floor drains are located in bathroom facilities and in most boiler rooms. While it is likely that the floor drains are connected to the combined sewer, the School Department is unsure where they discharge too. Roof drains and catch basins tie into the City's MS4. The School Department does not have a routine inspection or cleaning program for these structures. M/S would contact the City's DPW if there was a visible problem with any of the catch basins.

8.5.1 Landscaping and Athletic Field Maintenance

Pesticides and fertilizers are not regularly used on public landscaped areas except in the early fall. School athletic fields and the areas along curb lines receive more frequent applications. Branches, leaves and excess grass clippings are raked and brought to the composting area behind Connelly Stadium. The School Department has a cut and trim contract with M/S for

lawn care and chemical pesticides and fertilizer application. M/S mows each of the 58 buildings weekly. Soil samples are collected before fertilizers are applied and tested at URI. Pesticide products are purchased from LESCO, who is environmentally up-to-date. Vehicles, equipment, and chemicals are stored in two, locked, cement warehouses at Connelly Stadium.

8.5.2 Winter Lot Maintenance

The School Department has a contract with M/S for snow removal from its parking lots, driveways, and sidewalks. M/S receives their deicing materials from the city, which tracks how much is used per storm event. Typically snow is pushed aside and allowed to melt. However, on a few occasions snow removal has been required. Sweeping the parking lots and playgrounds is not a required part of the City's contract with M/S. The DPW will sweep the lots, as a courtesy to the schools if they request it, or M/S will hire a sweeper to perform the work. It is estimated that the parking lots and playgrounds are swept at a minimum of twice per year.

8.5.3 Vehicle Maintenance

The School Department relies on 1st Student (formally Ryder) for most of it transportation needs and have a contract with them for the next 5 years. The School Department has a small fleet of vehicles that includes 1 truck and 4 to 5 vans. These vehicles are stored inside with the rest of the Department's equipment at Connelly Stadium. The School Department does have a garage facility. They bid out any maintenance work on these vehicles to local garages and will have the vehicles washed at a local car wash.

8.5.4 Waste Disposal

The School Department uses private contractor, currently BFI, to remove trash, and recyclables, from their facilities. There is a recycling program available throughout the school system. Each school elects whether or not to participate in the program. Currently about twenty-two out of forty-nine schools are involved with the program.

8.5.5 Spill Response

The School Department relies on its contract with M/S for spill response and clean up. M/S has a spill response procedure and extensive training in place for their employees. However, should a spill occur they would likely outsource the job to Clean Harbors. M/S provides an oil delivery service to the schools and checks the tanks regularly. Most oil is stored in underground storage tanks (USTs).

8.5.6 Personnel Training Program

The City's contractor, M/S provides extensive spill response training to its employees. M/S is also hired by the City to train the School Department's custodial staff. However, should it be necessary, school staff would alert Providence's Fire Department, M/S, and Clean Harbors to respond to spill incidents.

8.6 Fire & Police Departments

Providence has fourteen Fire Stations located throughout the city. Their locations are as follows:

- 10 Branch Ave. 02904
- LaSalle Square 02903
- 209 Fountain Street 02903
- 155 Humbolt Ave. 02906
- 489 Hartford Ave. 02909
- 151 North Main Street 02903
- 201 Messer Street 02909
- 223 Brook Street 02906
- 847 Broad Street 02907
- Reservoir Ave. 02907
- 426 Admiral Street 02905
- 776 Allens Ave. 02905
- 630 Atwells Ave. 02909
- Mount Pleasant Ave. 02908

The stations have floor drains, which connect to the City's combined sewer and storm water system. Vehicle washing is the primary discharge these floor drains. Fire tucks will be washed both indoors and outdoors dependent upon the weather. The Fire Department's maintenance garage has several floor drains connecting to the sewer. Employees are instructed and know not to dump anything down these drains. Each floor drains has a screen and is checked twice a month by the garages full-time janitor. The only vehicle washed at the garage is their repair van. The Police Department does not operate any facilities that would have floor drains.

8.6.1 Vehicle Maintenance

The Police Department has one local garage that they contract their vehicle maintenance work to. The contractor is responsible for their facility and manages their waste independently of the Police Department. The contractor also owns a private car wash where the police cars are cleaned.

All Fire, Communication, and Rescue vehicles are maintained at one garage. This does not include washing and daily fluid checks, which are done at the stations. Several gallons of fluids, including transmission fluid and antifreeze, are stored inside for daily use. Antifreeze drums are sealed when not in use. There are two aboveground storage tanks located inside the facility for virgin motor oil. Waste oil filters are collected in a barrel and waste oil is stored in sealed drums. Waste fluids are stored inside and are disposed of by a licensed contractor.

8.6.2 Spill Response & Personnel Training Program

The Police Department relies on the Fire Department for initial spill response. The Fire Department is consulted regarding potentially hazardous conditions, spills or accidents. The HAZMAT teams are the first responders to the scene and mitigate spills. The Fire Department works closely with RIDEM and Clean Harbors who conduct clean-up efforts. The company or person who generated the spill is financially responsible for the clean up. All firefighters are trained to the operational level for hazardous materials response (24 hours) and are annually recertified with an 8-hour refresher course. There is also a HAZMAT team of twenty to thirty fire fighters trained to the technician level.

When the Fire Department responds to incidental spills, for example car accidents, small amounts of spilled product are often absorbed with Speedi-dry and RIDEM or Clean Harbors is notified to complete the clean up. On occasion the DPW or RIDOT will also complete the clean-up depending on the street's jurisdiction. The Fire Department does not have the facilities for cleaning up or storing used spill response materials. The Fire department has two trailers equipped with spill response materials including Level A and B suits, pigs, booms, and a shower decontamination set-up. There is also a Special hazards Vehicle that stores the Departments metering equipment. These vehicles could be used either at the spill site or to control a spill at any of their stations or city-owned garages.

The Fire Department's maintenance garage has Speedi-dry and "pigs" (long sock tubes filled with absorbents) for spill response. Garage employees including the janitor receive spill response training.

8.7 Implementation Alternatives

The City of Providence currently implements many of the elements of a successful operation and maintenance program. Critical to the success of this program, is the need to define specific responsibilities and to create a documented schedule for implemented controls. The following paragraphs describe ways to achieve compliance with the standards of the Pollution Prevention/Good Housekeeping minimum control measure.

Develop and implement an operation and maintenance program with the goal of preventing or reducing pollutant runoff from municipal operations into the storm sewer system; and

While the City of Providence has incorporated many of the elements of a successful operation and maintenance program, this report offers several alternatives for the City to consider upgrading the effectiveness of its current programs. These recommendations have been divided into each of the principal operation and maintenance functions provided by the City.

a) Public Street and Parking Lot Sweeping

- Develop sweeping records to allow the sweeping program to be evaluated and determine specifically what streets have greater sediment accumulation. These records could simply consist of noting the dates that the street was swept and the approximate volume of sediment removed. This data could be used to determine if more frequent sweeping should be conducted on some streets and less frequent sweeping on others. This data could also be compared to sand application data to determine the effectiveness of the sweeping program.

- Note areas that collect sediment or trash rapidly during sweeping operations as part of the record keeping process. These areas should then be further investigated to determine the source of the pollutants (e.g., erosion, poor waste handling operations, or construction activities).

- In addition to annual post de-icing sweeping, consider collecting leaf litter and other debris that accumulates in the street gutter during sweeping in the fall. Any leaf litter swept into the street should instead be collected on site to minimize the amount collecting in the storm water system. Record keeping will allow the City to determine if these additional efforts are bringing significant pollutant removal benefits.

- Incorporate school parking lots and playgrounds into the street sweeping schedule to ensure the schools are swept twice annually. This could be done during the city's initial spring pass and final autumn pass, when six sweepers are used. Another option is to add parking lot and playground sweeping to the M/S school maintenance contract and require them to create a schedule and maintain records.

- Modify existing training program for equipment operators to include operation of equipment to prevent pollution, record keeping and proper storage of sweepings.

b) Detention basin, catch basin and storm drain inspection and cleaning

- The City of Providence is responsible for approximately 12000 catch basins, 4,000 inlets, 32 tide gates, and 99 slots. While there are half a dozen trained operators there are only two bucket trucks that are over 15 years old. Although these trucks are deployed daily, the average catch basin is cleaned once every two years. If annual catch basin cleaning is required then the City's DPW will be responsible for approximately 48 catch basins per working day. Establishing dedicated crews and purchasing two new trucks would help ensure completion or this requirement. This may require the City to hire or train additional employees or consider contracting out catch basin maintenance work.

- Prior to establishing a formal storm drainage inspection and cleaning program, the City should conduct a pilot program where they select several catch basins in

various parts of the City representing different land uses. These basins should be inspected monthly, after cleaning, for one year to determine how rapidly sediment accumulates in them. This pilot program should provide Providence with a basis to determine appropriate regularly scheduled cleaning.

- During the first year of the permit inspect all catch basins and treatment structure. This inspection should document the location and physical condition.

- Include catch basins on school grounds in the City's cleaning and inspection routes. The catch basins should be inspected twice annually and cleaned at least once annually. Another option is to add catch basin cleaning and inspection to the M/S school maintenance contract.

- Research the City's storm water system for detention basins and vortex structures that the City may be responsible for maintaining. Establish a list of City versus State storm water control and treatment structures. Coordinate with RIDOT on where future vortex structures and detention basins will be installed and how they will be maintained. Verify all interconnections with other MS4s.

- Establish a documented inspection and cleaning schedule that prioritizes areas based on potential pollution and flooding impacts.

- Maintain records, including the amount of sediment and debris removed, of all cleaning and inspections for the City's storm sewer system to allow easy reference by street and to identify potential problem areas.

- Maintain records of dry weather discharges noted during catch basin cleaning and corrective actions taken.

- Develop a checklist for inspection procedures and a reporting mechanism to allow any necessary cleaning to be scheduled. Once developed, consider using sketches of particular areas of the storm sewer system to help with future maintenance and to identify problem areas.

- In conjunction with planned roadway improvements, consider replacing or reconstructing catch basins, particularly in areas with chronic flooding problems or sedimentation in receiving waters.

c) Fleet vehicle maintenance

- Develop procedures for spill prevention and cleanup procedures. Supply the garages with spill kits and additional spill and clean-up materials. Appropriate staff, including drivers and "first responders," should receive annual training in these procedures to raise awareness as well as to minimize the potential for a spill to enter the MS4.

- Close and seal floor drains in the City's maintenance garages that discharge to drywells, the combined sewer system, or the storm water system. Consider installing pollution control equipment, such as an oil/water separator for floor drains discharging to the sanitary sewer. Investigate floor drains in garages and schools with unknown connections.

- Conduct a detailed annual environmental compliance inspection of the Public Works, Fire Department, Parks Department, and School Department garages to assess the effectiveness of BMPs implemented under this plan, identify potential pollution sources and take appropriate action to address the problem.

d) Winter road and lot maintenance

- While one storage location is indoors, consider providing enclosed storage for all other road salt, sand/salt mix, and sand piles. Dissolved salts and sediments from exposed piles have potential water quality impacts. An enclosed structure will minimize the amount of material mobilized by storm water.

- Consider identifying areas and ways the City can reduce the amount of sand and salt used on roads and parking lots with out compromising safety. For example, ensuring proper spreader calibration and using road temperature sensors to estimate an appropriate level of salt application. Also, records of salt use, meteorological conditions, and effectiveness could be maintained for areas where large of amounts of deicing salts have historically been used.

e) Municipal landscaped areas maintenance

- Consider targeting an education campaign towards discouraging feeding geese in public parks. Consider placing signage in the parks as part of this campaign.

- To address pet waste in Providence's parks we suggest starting with a public education campaign followed with aggressive enforcement. Consider coordinating enforcements efforts with the DPW Environmental Department.

f) Waste removal and handling

- Conduct a survey of residents to determine their current practices to dispose of household hazardous wastes, waste oils, and automotive fluids. This survey would determine whether public education or solid waste services should be enhanced as well as increase public awareness.

- Consider having the DPW publish a semiannual newsletter that provides residents with information about where and how they can properly dispose of waste as well as the impacts of improper disposal. For example, the newsletter could promote

services like Eco-Depot and list out quantities of dumped materials the DPW retrieved. Refer to Appendix J for an example of a newsletter distributed in the City of Pawtucket. Additionally, this information, including electronic copies of the DPW newsletters, should be included on the municipal website.

g) Hazardous materials handling and storage

- Post prominently displayed emergency action plans in areas where hazardous materials are used or stored in the event of spills or accidents.

- Provide easily accessible equipment or materials to properly minimize the impacts of spills. Purchase spill kits for the City's maintenance garages. Also provide response training and instructions on proper disposal of cleanup waste.

- Perform annual training and practice drills to reinforce proper emergency action and to determine weaknesses in current operations or to develop new BMPs.

- Conduct a detailed inspection annually of the City's maintenance garages to identify potential pollution sources and take appropriate action to address the problem.

9.0 PLAN SUMMARY/IMPLEMENTATION MEASURES

The City of Providence currently implements many of the elements of a successful Storm Water Management Program. In order to fully comply with the RIPDES General Permit issued by RIDEM, the City must implement additional measures. The following table (also found in Appendix K) outlines those measures, identifies the responsible parties, measurable goals, and provides a schedule for implementation over the five year permit term. The listed measures were identified through several workshops conducted with the City's Storm Water Committee. Technical Memorandums (TMs) were prepared for each of the six minimum control measures. At these workshops the TMs were reviewed and implementation alternatives were discussed. Where possible, the measurable goals are identified as quantifiable measures. In other instances the measurable goals are presented as discrete activities. For these, the conduct of the activity is intended to serve as the goal.

10.0 PROGRAM EVALUATION

10.1 Revisions to Storm Water Management Program

The City must annually evaluate the compliance of its storm water management program with the conditions of the general permit. The evaluation must consider the appropriateness of the selected BMPs in efforts towards achieving the defined measurable goals. The storm water management program and associated plan may be changed in accordance with the following provisions:

- Changes adding (but not subtracting or replacing) components, controls or requirements to the Plan may be made at any time upon written notification to RIDEM,

- Changes replacing an ineffective or infeasible six minimum control measure BMP, specifically identified in the SWMPP, with an alternative BMP may be requested at any time. Unless denied, changes proposed in accordance with the criteria below shall be deemed approved and may be implemented sixty (60) days from submittal of the request. If the request is denied, RIDEM will send a written explanation of the denial. Changes replacing an ineffective or infeasible storm water control specifically identified in the SWMPP or in an approved Scope of Work document to meet the requirements of an approved TMDL, may be requested at any time, however, written approval from the Department must be received prior to implementing changes.

- Modification requests, must include the following information:

    - Analysis of why the BMP is ineffective or not feasible (e.g., cost prohibitive).
    - Expectations on the effectiveness of the replacement BMP.
    - Analysis of how the replacement BMP is expected to achieve the goals of the BMP to be replaced.

Revision requests or notifications must be in writing and signed in accordance with the signatory requirements of the permit.

RIDEM may require changes to the Plan as needed to:

- Address impacts on receiving water quality caused or contributed to by discharges from the MS4,
- To include more stringent requirements necessary to comply with new Federal statutory or regulatory requirements, or
- To include such other conditions deemed necessary to comply with the goals and requirements of the Clean Water Act.
- Include a revised scope of work and implementation schedule necessary to comply with the TMDL requirements.

10.2 Annual Report

The City must submit an annual report that summarizes information regarding storm water management activities during the previous calendar year and planned activities for the upcoming year. The initial report is due one year from the effective date of the general permit and annually thereafter. Provided in Appendix L is a draft template for annual reporting.

The following information must be contained in the annual report:

- A self assessment review of compliance with the permit conditions.
- Assessment of the appropriateness of the selected BMPs.
- Assessment of the progress towards achieving the measurable goals.
- Assessment of the progress towards meeting the requirements for the control of storm water identified in an approved TMDL.
- Summary of results of any information that has been collected and analyzed. This includes any type of data.
- Discussion of activities to be carried out during the next reporting cycle.
- A discussion of any proposed changes in identified BMPs or measurable goals.
- Date of annual notice and copy of public notice.
- Summary of public comments received in the public comment period of the draft annual report and planned responses or changes to the program.
- Planned municipal construction projects and opportunities to incorporate water quality BMPs, low impact development as well as activities to promote infiltration and recharge.
- Newly identified physical interconnections with other small MS4s.
- Coordination of activities planned with physically interconnected MS4s.
- Summary of the extent of the MS4 system mapped, actions taken to detect and address illicit discharges including: the number of illicit discharges detected, illicit discharge violations issued, and violations that have been resolved. Number and summary of all enforcement actions referred to RIDEM.
- Summary of the number of site inspections conducted for erosion and sediment controls, inspections that have resulted in an enforcement action, and violations that have been resolved. Number and summary of all enforcement actions referred to RIDEM.
- Summary of the number of site inspections conducted for proper installation of post construction structural BMPs, inspections that have resulted in an enforcement action, and violations that have been resolved. Number and summary of all enforcement actions referred to RIDEM.
- Summary of the number of site inspections conducted for proper operation and maintenance of post construction structural BMPs, inspections that have resulted in an enforcement action, and violations that have been resolved.
- Reference any reliance on another entity for achieving any measurable goal.

10.3 Record Keeping

All records required by the general permit must be kept for a period of three years. Records include information used in the development of the storm water management program, any monitoring, copies of reports, and all data used in the development of the notice of intent.

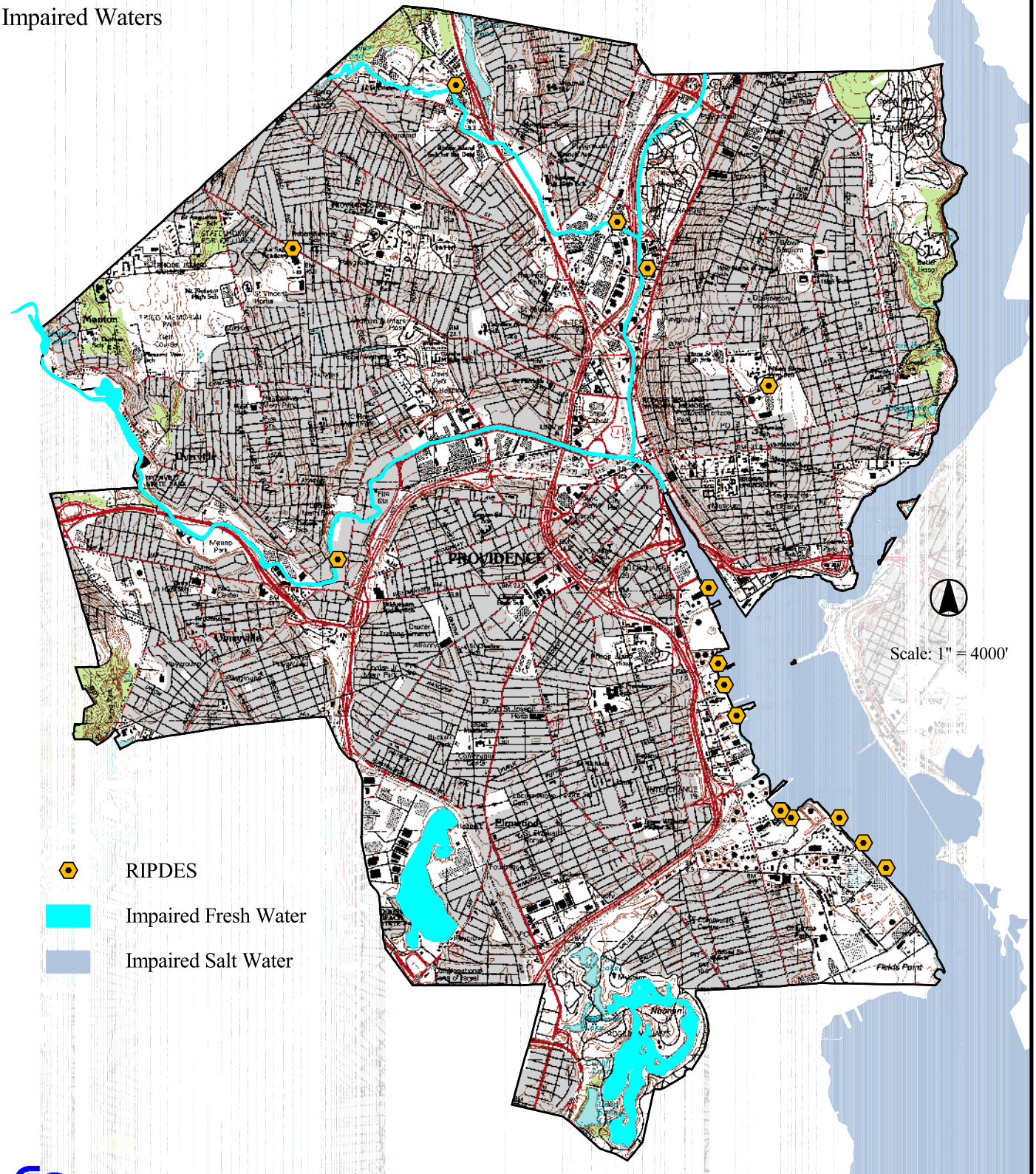
Records need to be submitted to RIDEM only when specifically requested by the permitting authority. The City must make this plan and records relating to the general permit available to the public.

FIGURES

Figure 1

City of Providence

Impaired Waters



FUSS & O'NEILL INC. Consulting Engineers

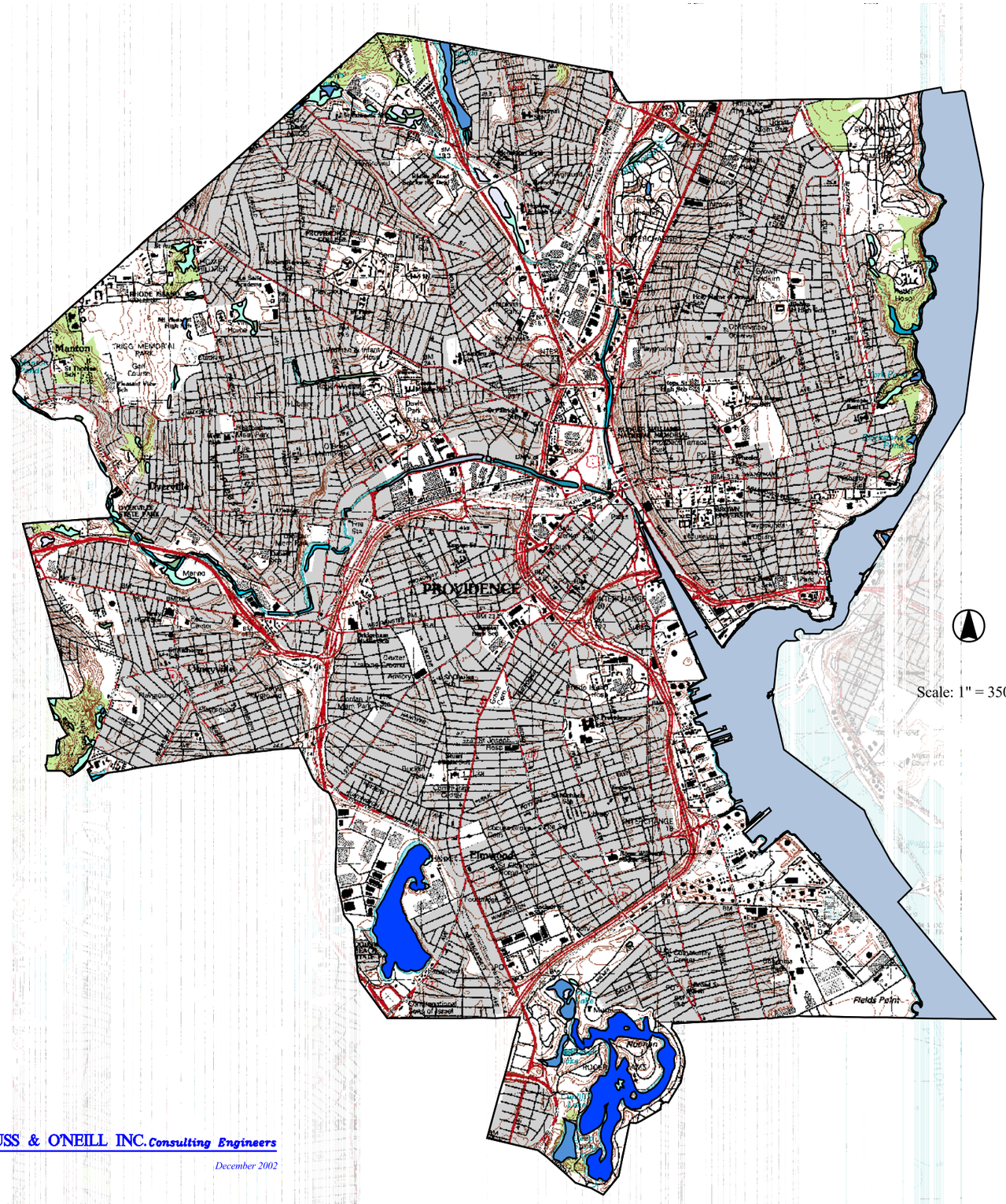
December 2002

Source: All data layers compiled from RIGIS

Figure 2

City of Providence

Wetlands



- Emergent Wetland: Marsh/Wet Meadow
- Estuarine Emergent Wetland
- Estuarine Open Water
- Forested Wetland: Deciduous
- Lacustrine Open Water
- Palustrine Open Water
- Riverine Nontidal Open Water
- Riverine Tidal Open Water
- Scrub-Shrub Swamp

Wetlands cover 339 Acres.
Approximately 3% of the City.

FUSS & O'NEILL INC. *Consulting Engineers*

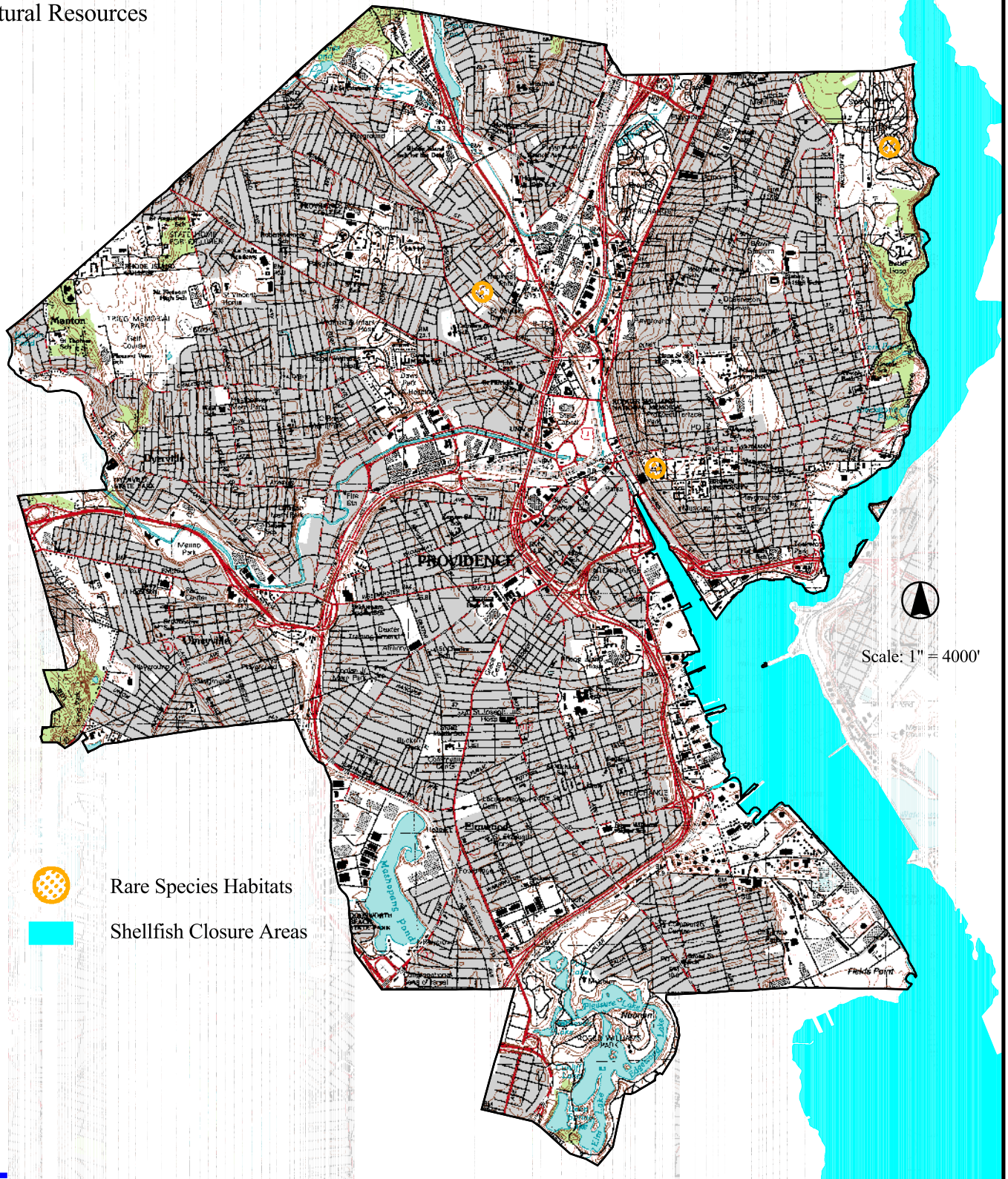
December 2002

Source: All data layers compiled from RIGIS

Figure 3

City of Providence

Natural Resources



FUSS & O'NEILL INC. *Consulting Engineers*

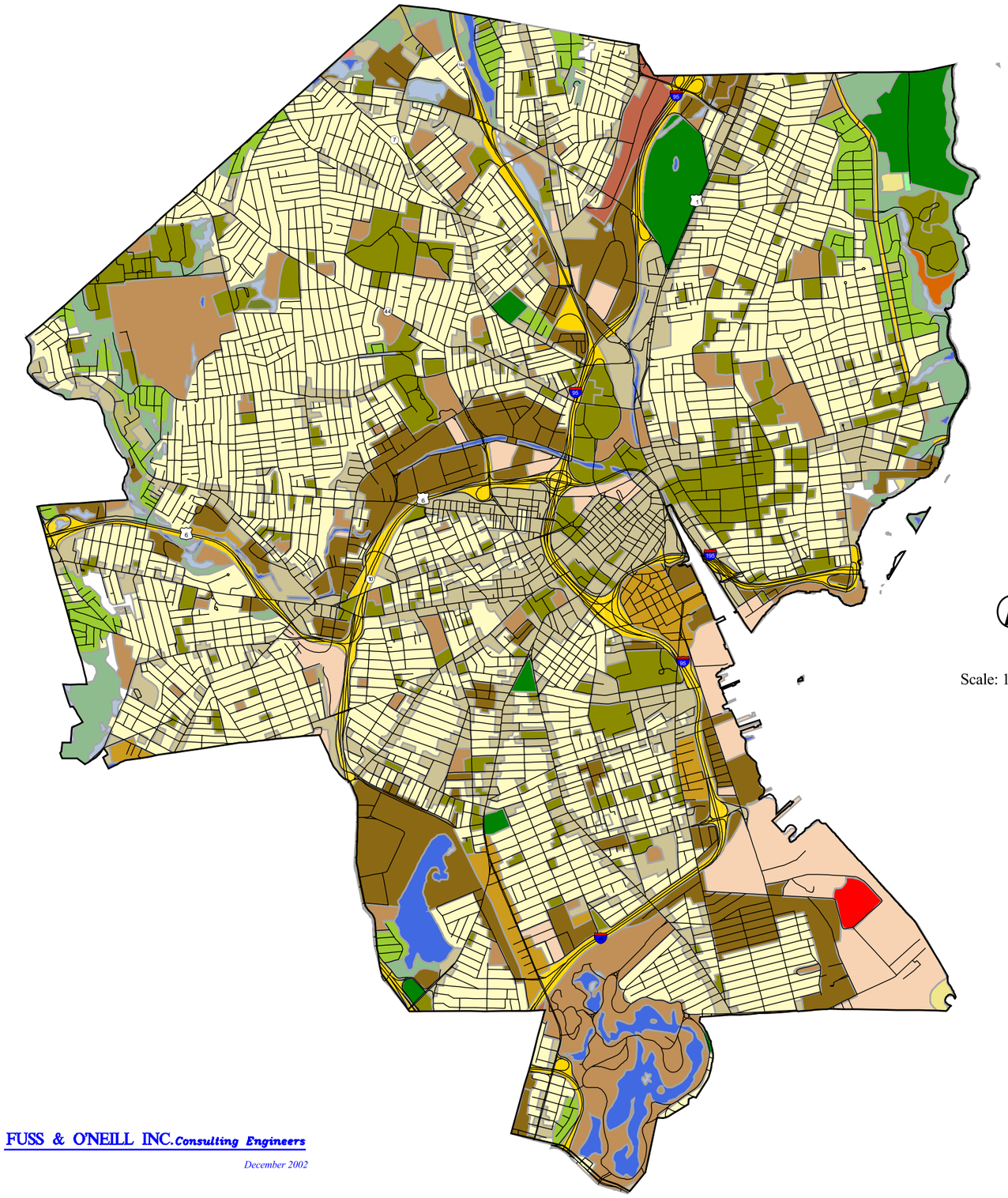
December 2002

Source: All data layers compiled from RIGIS

Figure 4

City of Providence

Land Uses



Scale: 1" = 3500'

Approximately 12,035 Acres in the City consisting of:

- Brushland - 37 Acres, 0.3%
- Cemeteries - 288 Acres, 2.4%
- Commercial - 1,396 Acres, 11.6%
- Commercial / Industrial Mixed - 180 Acres, 1.5%
- Deciduous Forest (>80% hardwood) - 382 Acres, 3.2%
- Developed Recreation - 873 Acres, 7.3%
- High Density Residential (<1/8 acre lots) - 4,787 Acres, 39.8%
- Industrial - 1,089 Acres, 9%
- Institutional - 1, 067 Acres, 8.9%
- Med. Density Residential (1 to 1/4 acre lots) - 30 Acres, 0.2%
- Med. High Density Residential (1/4 to 1/8 acre lots) - 349 Acres, 2.9%
- Mines, Quarries and Gravel Pits - 1 Acre
- Mixed Evergreen Forest (50 to 80% softwood) - 14 Acres, 0.1%
- Orchards, Groves, Nurseries - 2 Acres
- Other Transportation (terminals, docks, etc.) - 525 Acres, 4.4%
- Pasture - 3 Acres
- Railroads - 71 Acres, 0.6%
- Roads - 488 Acres, 4.1%
- Transitional Areas (urban open) - 56 Acres, 0.5%
- Vacant Land - 14 Acres, 0.1%
- Waste Disposal - 16 Acres, 0.1%
- Water - 247 Acres, 2.1%
- Water and Sewage Treatment - 27 Acres, 0.2%
- Wetland - 93 Acres, 0.8%

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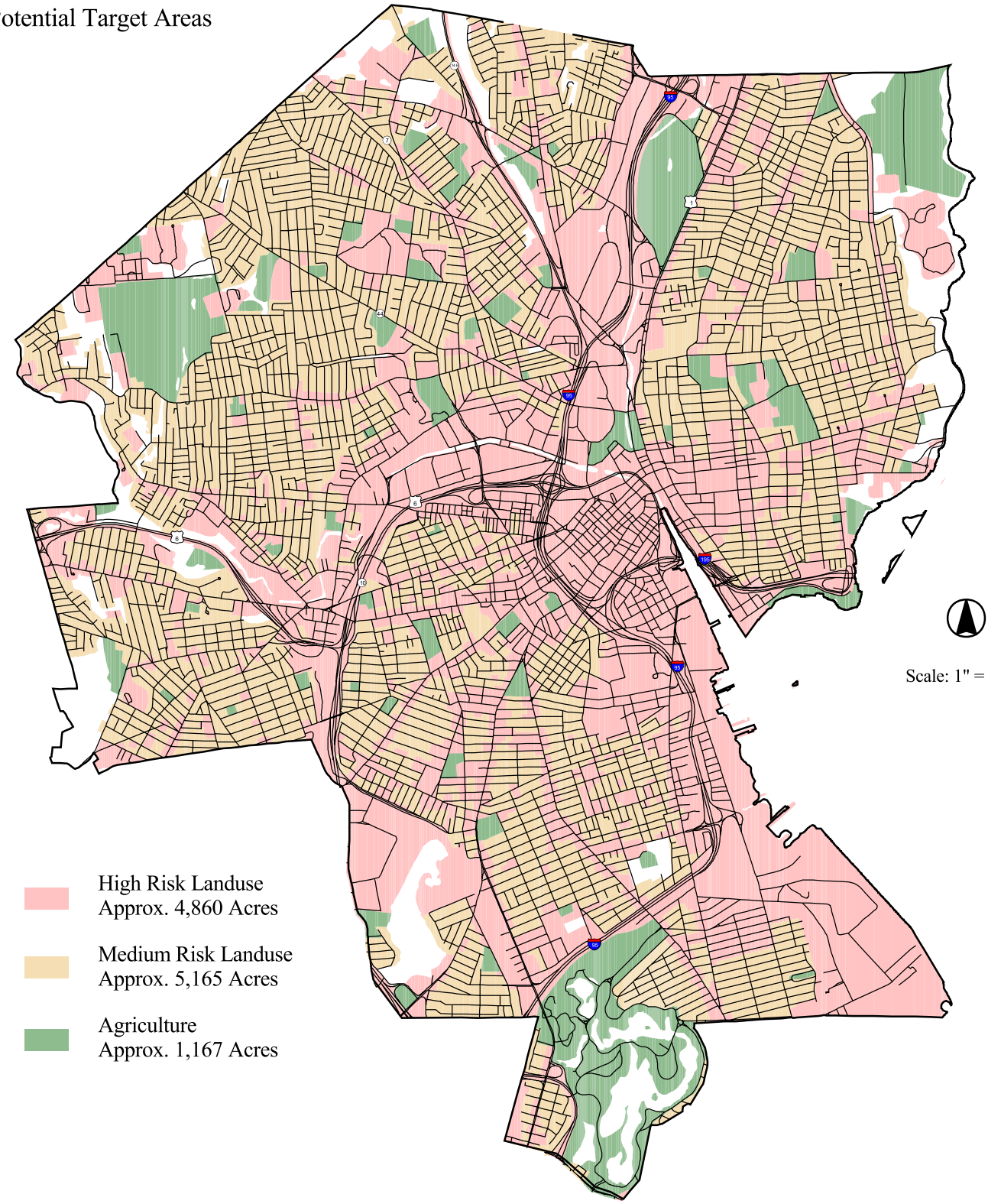
December 2002

Source: All data layers compiled from RIGIS

Figure 5

City of Providence

Potential Target Areas



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December 2002

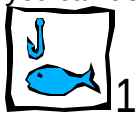
Source: All data layers compiled from RIGIS

APPENDIX A

EDUCATION AND OUTREACH

10 THINGS YOU CAN DO TO IMPROVE WATER QUALITY IN RHODE ISLAND

There are many streams and rivers that flow through our backyards and drain into ponds, lakes, bays and ultimately the ocean. Pollutants such as animal feces, fertilizer, oil, hazardous waste, road sand, and grease on the land can be washed into our waters, but we can reduce this type of pollution. Here is a list of 10 things you can do to help clean our local waterways.



1. Learn about your local waters. Everyone lives in a **watershed**, which is the drainage area to a local waterbody (think of washing everything in a sink down the drain and the drain is your local river or stream). Figure out what waters are closest to you and where they flow. Learn about local animal life and plants that live in and around these waters. Check out DEM's website to find out more about your watershed at **www.state.ri.us/dem/topics/water.htm**

2. Don't feed ducks! Although you may enjoy feeding geese, ducks, gulls and other waterfowl, remember that they too contribute to the same type of pollution that limits swimming and shellfishing. One bird dropping can contaminate 10,000 gallons of water. Bread and other human food are bad for bird's digestive tracts too. Feeding waterfowl can also attract larger bird populations and may cause some birds to stop migrating.

3. Pick up after your pets. Dog waste and feces from other warm-blooded animals pollute local waterways and are larger polluters than you may think. This type of pollution contributes to the closing of beaches and shellfish beds all over the state. Pick up your pet's waste and deposit it in a trash can.

4. Inspect septic systems. Approximately 1/3 of the state uses some form of septic system for sewage disposal. Failing septic systems or cesspools are a major source of pollution to ground water and local reservoirs. What you flush directly affects the water we drink and the waters where we fish, swim and boat. If you have a septic system inspect it regularly, pump and repair it as needed. If you have a cesspool, replace it. For more information on maintaining a healthy septic system the **Septic System Checkup Handbook is available online at www.state.ri.us/dem/pubs/regs/regs/water/isdsbook.pdf or** call for a copy at **222-6822.**

5. Avoid over-fertilizing your lawn. During rain storms, **nutrients** from lawn fertilizer can be washed off lawns and paved areas into local waters. This type of pollution contributes to **eutrophication**, a process that causes nuisance algal blooms and reduction of habitat and oxygen levels for many aquatic organisms. This leads to a decline in fish and shellfish populations, and reduces the diversity of fish in our waters. Get your soil tested to see if it really needs more fertilizer and if so, use as little as necessary. Read the label on fertilizer packages, apply according to directions, and clean-up any fertilizer left on paved areas. Also, reduce your lawn area by planting native, more drought-tolerant plants that are better adapted for the environment, and can act as buffers to prevent runoff from your lawn. For more information and fact sheets, log onto the **University of Rhode Island Cooperative Extension Home*A*Syst** website at **www.uri.edu/ce/wq.**

6. Minimize the use of hazardous products and **recycle** as much as possible. Cleaning and other household products contain many hazardous chemicals. Try to use the least harmful products available. Learn how to dispose of household hazardous chemicals properly by calling the **RI Resource Recovery program** at **942-1430 x 241** or visit them online at **www.rirrc.org.** The RIRRC website also has recycling information. Recycling helps to conserve natural resources and reduces the amount of refuse sent to landfills. Start a compost bin and buy products made with or packaged in recycled material to reduce waste further. Consult your town for **recycling** guidelines and check the RIRRC website listed above.

7. Get involved. **Volunteer.**

Help with clean-up efforts or be a volunteer water monitor. Participate in local activities that benefit the environment. Find out if there is a watershed council near you. A list is available on DEM's website at **www.state.ri.us/dem/topics/water.htm.** If your watershed does not have an association, start one! Other statewide non-profit organizations also need volunteers. For more information check out the websites for Save the Bay at **www.savebay.org** and URI's Watershed Watch at **www.uri.edu/ce/wq/.** Every little bit you do counts! **Speak out.** Attend public meetings that pertain to water quality. Your participation makes the statement that your community is concerned about local waterways. Public involvement is imperative if your local and state public servants are to help you make large-scale improvements in your watershed. If you see a problem in your area or want something done, say something! If you don't have time to attend meetings, call or contact a city or town official, a state representative, or DEM.

8. Conserve water.

If you are connected to a public sewer, conserving water will help reduce the discharge from your wastewater treatment facility into local waters. Water conservation helps prevent septic system failures. To learn more about conserving water, visit the RI Water Resources Board at **www.wrb.state.ri.us.**

9. Pump it,

don't dump it! If you own a sailboat or a motorboat have your holding tank emptied at one of the local pumpout stations around Rhode Island. For a list of **pumpout locations call 222-3961** or visit **www.state.ri.us/dem/maps/static/pumpmap.jpg**. Also, if you have an old engine on your motor boat, look into updating it to a new 2-cycle or 4-cycle engine. They are cleaner for the environment and more efficient, which means they are lighter on your wallet!

10. Get out!

Get out on the water. Swim, sail, surf, kayak, fish, windsurf, boat, shellfish, go birding or walk along the shore. Explore the waters near your home or visit other parts of the state. For information about beach closures, contact the Department of Health **Beach Hotline at 222-2751** or online at **www.health.state.ri.us/topics/bathing.htm.** For information on **shellfish bed closures, call DEM at 222-3961**. Make it a point to enjoy the benefits of living near the water, and while you're out there keep an eye out for problems or pollution sources. **To file an environmental complaint with DEM** (which can be anonymous), **call: 222-1360.**

Rhode Island Department of Environmental Management
Office of Water Resources
235 Promenade Street, Providence, RI 02908-5767
Phone (401) 222-6800
www.state.ri.us/dem/

V. Masson April 2003

10

SIMPLE THINGS YOU CAN DO TO HELP CLEAN RHODE ISLAND WATERS

Septic System Information
for Rhode Islanders

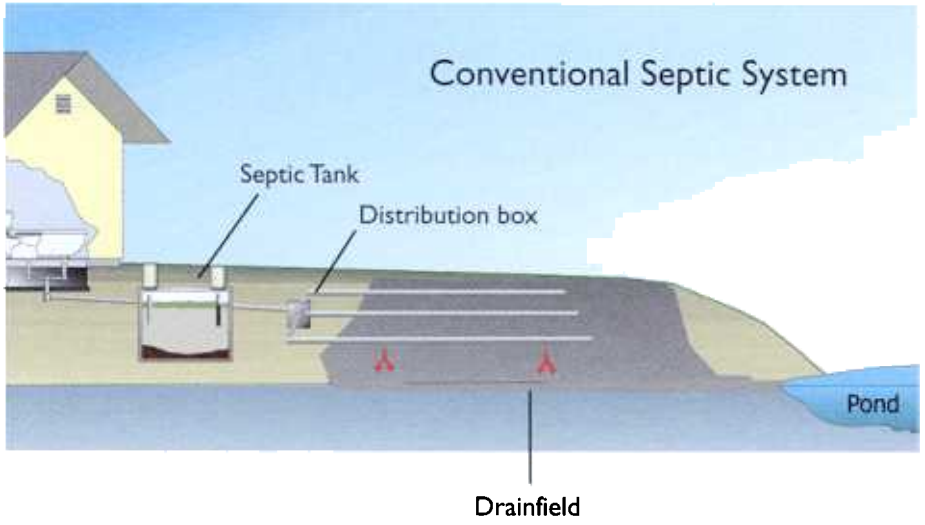
WHAT'S IN YOUR BACKYARD?

Forty percent of Rhode Islanders get their drinking water from groundwater or small local reservoirs. Outdated cesspools and failing septic systems are a major source of pollution to these water supplies. What you flush down your toilet directly affects the water you drink and the waters you fish, swim, and boat in.

What YOU can do.
- **Inspect your septic system regularly**
- **Pump and repair it as needed**
- **If you have a cesspool, plan to replace it**

CONVENTIONAL SEPTIC SYSTEMS

When properly designed, installed, and maintained, septic systems help keep your water supply safe. They replenish groundwater, and they are considered a permanent disposal option. All septic systems need regular maintenance. It is much less expensive to keep them operating properly through regular inspections and pumping than to replace them if they fail. With proper care a conventional septic system can be long lasting and cost effective.



There are two major parts to a conventional septic system

THE SEPTIC TANK

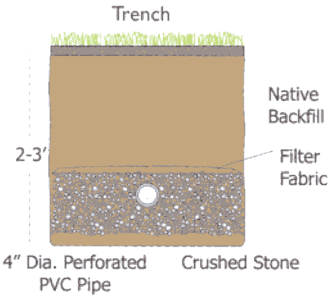
The septic tank separates solids from liquid before sending wastewater to the drainfield. A layer of sludge settles at the bottom and a layer of scum forms at the top, so only the clearest wastewater goes into the ground. Keeping solids in the tank and out of the drainfield is the best way to prolong system life.

Modern Tank features include:
- Water tightness, solids gradually build up and must be pumped out regularly.
- Access risers allow easy entry for inspection and pumping.
- A low cost effluent filter to help keep solids in the tank and protect your drainfield.

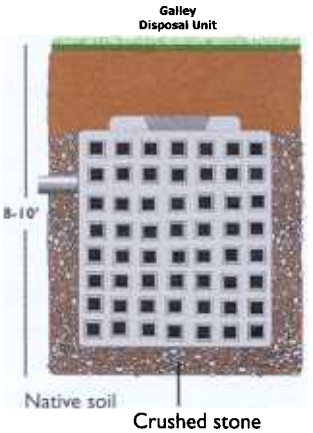
THE DRAINFIELD

Drainfields distribute the wastewater to the soil. Two types commonly used are disposal trenches and leaching chambers.

A **Trench**-type drainfield consists of two or more parallel stone-lined ditches, each with a perforated pipe that allows incoming liquid wastewater to seep into the soil. A distribution box located between the tank and the drainfield splits wastewater flow to the different lines.



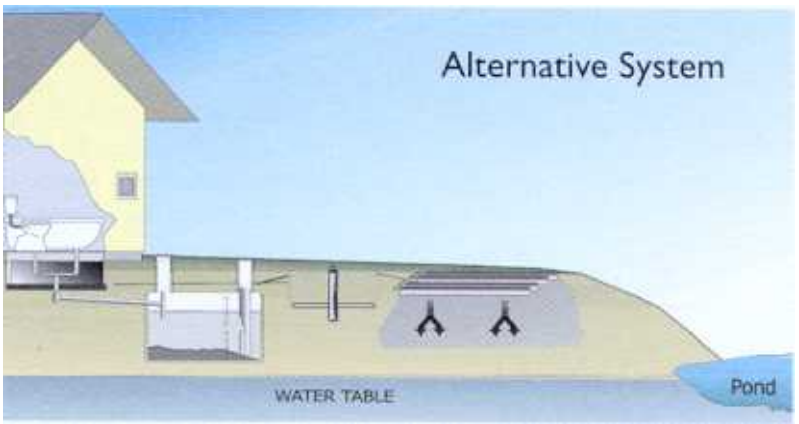
Leaching chambers are bottomless concrete box-like structures with open, grated sides. Two types are commonly used. "Galleys" are 4ft. x 4ft. X 4ft. units installed as deep as 10 feet below ground. "Flow diffusers" are shallow 8ft. X 4ft. x 18in. units. Both types of seepage pits are generally installed in a series of three or more. Liquid effluent flows directly from the tank into the seepage pit where it seeps out the side walls and bottom.



UNIVERSITY OF RHODE ISLAND
Rhode Island Regional Water Quality Program
University of Rhode Island College of Environment & Life Sciences
Department of Natural Resources Science
Cooperative Extension On-Site Wastewater Training Center

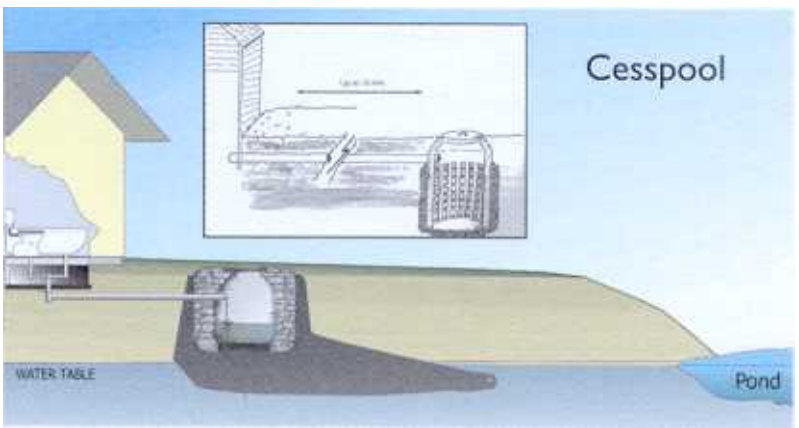
ALTERNATIVE SEPTIC SYSTEM

New technologies treat wastewater before it reaches groundwater. These alternative systems provide one or more extra treatment steps than conventional systems. Enhanced treatment systems offer solutions for difficult sites and environmentally sensitive areas.



CESSPOOLS

A cesspool is nothing more than a covered pit that receives wastewater and allows it to drain into the surrounding soil. This might be a stone-walled pit, perforated concrete chamber, or leaking steel tank. Although still in common usage, cesspools don't treat wastewater. Solids and liquids seep directly through the soil into the groundwater. This poses a threat to surrounding bodies of water and nearby wells. Not sure what's in your backyard? Chances are you have a cesspool or other substandard system if your house was built before 1970.



FAILING SEPTIC SYSTEMS

Septic systems fail when wastewater is unable to seep into the ground. Common causes of failure are:

- Overloading with too much water.
- Improper disposal of solids or grease.
- Tank full of solids, drainfield clogged with solids.
- High water table flooding the drainfield.
- Broken pipes, tree roots disrupting system, or other damage.

Your system may be failing if you have:

- Sluggish drains or odor
- Wastewater backups into house
- Squishy patches above drainfield
- Lush grass above drainfield

Even if you don't notice any problem, your system can still be polluting groundwater. In very sandy or wet soils wastewater may reach the groundwater too quickly. Leaking tanks or broken pipes allow wastes to seep into groundwater without treatment.

Even new systems can fail due to faulty design or poor installation. Common causes are use of unwashed stone or poor-quality gravel fill, improperly sealed tank seams and plugs, and soil compaction or structural damage by heavy equipment driven over the system.

FIND OUT WHAT'S IN YOUR BACKYARD

To keep drinking water safe, and maintain property values, many RI towns require regular system maintenance. Financial assistance may be available for repairs. Contact your town hall to learn more. For technical information contact URI Cooperative Extension at 401-874-4558/5950 or http://www.uri.edu/ce/wq.

Cooperative Extension in Rhode Island provides equal opportunities in programs and employment without regard to race, color, national origin, sex, or preference, creed or disability. This publication is supported by URI Cooperative Extension, College of the Environment and Life Sciences, University of Rhode Island. Partial funding for this project provided by CSREES, Project 92- EWQI-1-1040, and the EPA Block Island/ Green Hill Pond Watershed National Community Decentralized Wastewater Treatment Demonstration Project, Clean Water Act section 319, and the RI Department of Environmental Management.

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11/01

Stormwater Pollution Found in Your Area!

This is not a citation.

This is to inform you that our staff found the following pollutants in the storm sewer system in your area. This storm sewer system leads directly to

_____ .

- ❑ Motor oil
- ❑ Oil filters
- ❑ Antifreeze/ transmission fluid
- ❑ Paint
- ❑ Solvent/degreaser
- ❑ Cooking grease
- ❑ Detergent
- ❑ Home improvement waste (concrete, mortar)
- ❑ Pet waste
- ❑ Yard waste (leaves, grass, mulch)
- ❑ Excessive dirt and gravel
- ❑ Trash
- ❑ Construction debris
- ❑ Pesticides and fertilizers
- ❑ Other

_____

For more information or to report an illegal discharge of pollutants, please call:

WHEN IT RAINS IT DRAINS

www.epa.gov/npdes/stormwater

EPA
United States Environmental Protection Agency

EPA 833-F-03-002
April 2003

Stormwater runoff is precipitation from rain or snowmelt that flows over the ground. As it flows, it can pick up debris, chemicals, dirt, and other pollutants and deposit them into a storm sewer system or waterbody.

Anything that enters a storm sewer system is discharged *untreated* into the waterbodies we use for swimming, fishing, and providing drinking water.

Remember: Only Rain Down the Drain

To keep the stormwater leaving your home or workplace clean, follow these simple guidelines:

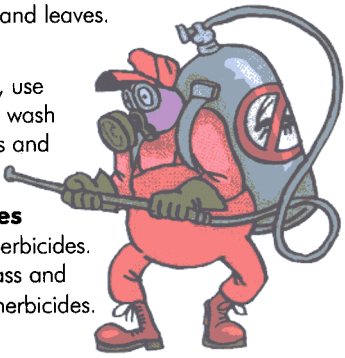
- Use pesticides and fertilizers sparingly.
- Repair auto leaks.
- Dispose of household hazardous waste, used auto fluids (antifreeze, oil, etc.), and batteries at designated collection or recycling locations.
- Clean up after your pet.
- Use a commercial car wash or wash your car on a lawn or other unpaved surface.
- Sweep up yard debris rather than hosing down areas. Compost or recycle yard waste when possible.
- Clean paint brushes in a sink, not outdoors. Properly dispose of excess paints through a household hazardous waste collection program.
- Sweep up and properly dispose of construction debris like concrete and mortar.

Keep Our Streams Clean!

Storm Drains lead to fresh water!

■ Street Litter, Plastics, and Leaves
Be mindful of litter, NEVER throw litter down into storm drains. Keep catch basins free of debris and leaves.

■ Fertilizers
Avoid use of fertilizers. If needed, use organic fertilizers. Sweep, do not wash any fertilizers or soil off driveways and walkways.



■ Pesticides and Herbicides
Minimize use of pesticides and herbicides. Use natural alternatives. Trim grass and remove weeds by hand without herbicides.

■ Pet Waste
Dispose of pet waste by flushing it down the toilet, burying it, or discarding it into a plastic bag and place in your trash.

■ Yard Waste
Do not allow soil, leaves or grass clippings to accumulate on your driveway, sidewalk or in the street. Compost yard waste and use on your soil.

■ Motor Oil
Never pour used motor oil down the drain. Take it to a local service station to be recycled.

■ Anti-Freeze
Take used Anti-Freeze to a service station for recycling. Never mix Anti-Freeze with any other substance.

■ Paint
Donate old paint to local groups. Dispose of oil and lead based paints at the designated household hazardous waste collection center, Bondi's Island Landfill. Appointments are available by calling 787-7840.

■ Household Hazardous Waste
Do not pour hazardous waste down any drain or discard with regular trash. Contact your Springfield Solid Waste Office (787-7840) to learn how to properly dispose of hazardous waste. Use natural or less toxic alternatives.

Sponsored by City of Springfield
Parks Dept.
Planning Dept.
Public Works Dept.
Water/Sewer Commission

EPA
United States
Environmental Protection
Agency

EPA 841-F-03-003

Protecting Water Quality *from* URBAN RUNOFF

Clean Water Is Everybody's Business

In urban and suburban areas, much of the land surface is covered by buildings and pavement, which do not allow rain and snowmelt to soak into the ground. Instead, most developed areas rely on storm drains to carry large amounts of runoff from roofs and paved areas to nearby waterways. The stormwater runoff carries pollutants such as oil, dirt, chemicals, and lawn fertilizers directly to streams and rivers, where they seriously harm water quality. To protect surface water quality and groundwater resources, development should be designed and built to minimize increases in runoff.

The most recent National Water Quality Inventory reports that runoff from urbanized areas is the leading source of water quality impairments to surveyed estuaries and the third-largest source of impairments to surveyed lakes.

Did you know that because of impervious surfaces like pavement and rooftops, a typical city block generates more than 5 times more runoff than a woodland area of the same size?

How Urbanized Areas Affect Water Quality

Increased Runoff

The porous and varied terrain of natural landscapes like forests, wetlands, and grasslands traps rainwater and snowmelt and allows them to filter slowly into the ground. In contrast, impervious (nonporous) surfaces like roads, parking lots, and rooftops prevent rain and snowmelt from infiltrating, or soaking, into the ground. Most of the rainfall and snowmelt remains above the surface, where it runs off rapidly in unnaturally large amounts.

Storm sewer systems concentrate runoff into smooth, straight conduits. This runoff gathers speed and erosional power as it travels underground. When this runoff leaves the storm drains and empties into a stream, its excessive volume and power blast out streambanks, damaging streamside vegetation and wiping out aquatic habitat. These increased storm flows carry sediment loads from construction sites and other denuded surfaces and eroded streambanks. They often carry higher water temperatures from streets, roof tops, and parking lots, which are harmful to the health and reproduction of aquatic life.

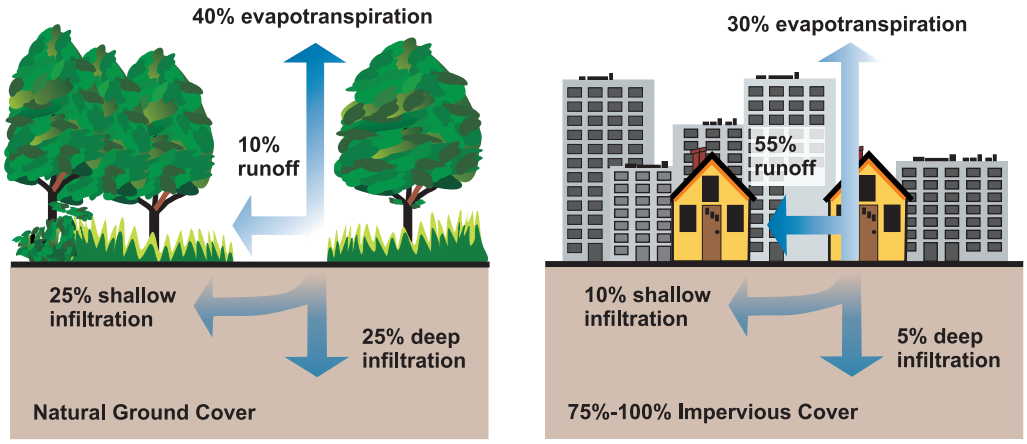
The loss of infiltration from urbanization may also cause profound groundwater changes. Although urbanization leads to great increases in flooding during and immediately after wet weather, in many instances it results in lower stream flows during dry weather. Many native fish and other aquatic life cannot survive when these conditions prevail.

Increased Pollutant Loads

Urbanization increases the variety and amount of pollutants carried into streams, rivers, and lakes. The pollutants include:

- Sediment
- Oil, grease, and toxic chemicals from motor vehicles
- Pesticides and nutrients from lawns and gardens
- Viruses, bacteria, and nutrients from pet waste and failing septic systems
- Road salts
- Heavy metals from roof shingles, motor vehicles, and other sources
- Thermal pollution from dark impervious surfaces such as streets and rooftops

These pollutants can harm fish and wildlife populations, kill native vegetation, foul drinking water supplies, and make recreational areas unsafe and unpleasant.



Relationship between impervious cover and surface runoff. Impervious cover in a watershed results in increased surface ruunoff. As little as 10 percent impervious cover in a watershed can result in stream degradation.

Managing Urban Runoff

What Homeowners Can Do

To decrease polluted runoff from paved surfaces, households can develop alternatives to areas traditionally covered by impervious surfaces. Porous pavement materials are available for driveways and sidewalks, and native vegetation and mulch can replace high maintenance grass lawns. Homeowners can use fertilizers sparingly and sweep driveways, sidewalks, and roads instead of using a hose. Instead of disposing of yard waste, they can use the materials to start a compost pile. And homeowners can learn to use Integrated Pest Management (IPM) to reduce dependence on harmful pesticides.

In addition, households can prevent polluted runoff by picking up after pets and using, storing, and disposing of chemicals properly. Drivers should check their cars for leaks and recycle their motor oil and antifreeze when these fluids are changed. Drivers can also avoid impacts from car wash runoff (e.g., detergents, grime, etc.) by using car wash facilities that do not generate runoff. Households served by septic systems should have them professionally inspected and pumped every 3 to 5 years. They should also practice water conservation measures to extend the life of their septic systems.

Controlling Impacts from New Development

Developers and city planners should attempt to control the volume of runoff from new development by using low impact development, structural controls, and pollution prevention strategies. Low impact development includes measures that conserve natural areas (particularly sensitive hydrologic areas like riparian buffers and infiltrable soils); reduce development impacts; and reduce site runoff rates by maximizing surface roughness, infiltration opportunities, and flow paths.

Controlling Impacts from Existing Development

Controlling runoff from existing urban areas is often more costly than controlling runoff from new developments. Economic efficiencies are often realized through approaches that target "hot spots" of runoff pollution or have multiple benefits, such as high-efficiency street sweeping (which addresses aesthetics, road safety, and water quality). Urban planners and others responsible for managing urban and suburban areas can first identify and implement pollution prevention strategies and examine source control opportunities. They should seek out priority pollutant reduction opportunities, then protect natural areas that help control runoff, and finally begin ecological restoration and retrofit activities to clean up degraded water bodies. Local governments are encouraged to take lead roles in public education efforts through public signage, storm drain marking, pollution prevention outreach campaigns, and partnerships with citizen groups and businesses. Citizens can help prioritize the clean-up strategies, volunteer to become involved in restoration efforts, and mark storm drains with approved "don't dump" messages.

Related Publications

Turn Your Home into a Stormwater Pollution Solution!
www.epa.gov/nps

This web site links to an EPA homeowner's guide to healthy habits for clean water that provides tips for better vehicle and garage care, lawn and garden techniques, home improvement, pet care, and more.

National Management Measures to Control Nonpoint Source Pollution from Urban Areas
www.epa.gov/owow/nps/urbanmm

This technical guidance and reference document is useful to local, state, and tribal managers in implementing management programs for polluted runoff. Contains information on the best available, economically achievable means of reducing pollution of surface waters and groundwater from urban areas.

Onsite Wastewater Treatment System Resources
www.epa.gov/owm/onsite

This web site contains the latest brochures and other resources from EPA for managing onsite wastewater treatment systems (OWTS) such as conventional septic systems and alternative decentralized systems. These resources provide basic information to help individual homeowners, as well as detailed, up-to-date technical guidance of interest to local and state health departments.

Low Impact Development Center
www.lowimpactdevelopment.org

This center provides information on protecting the environment and water resources through integrated site design techniques that are intended to replicate preexisting hydrologic site conditions.

Stormwater Manager's Resource Center (SMRC)
www.stormwatercenter.net

Created and maintained by the Center for Watershed Protection, this resource center is designed specifically for stormwater practitioners, local government officials, and others that need technical assistance on stormwater management issues.

Strategies: Community Responses to Runoff Pollution
www.nrdc.org/water/pollution/storm/stoinx.asp

The Natural Resources Defense Council developed this interactive web document to explore some of the most effective strategies that communities are using around the nation to control urban runoff pollution. The document is also available in print form and as an interactive CD-ROM.

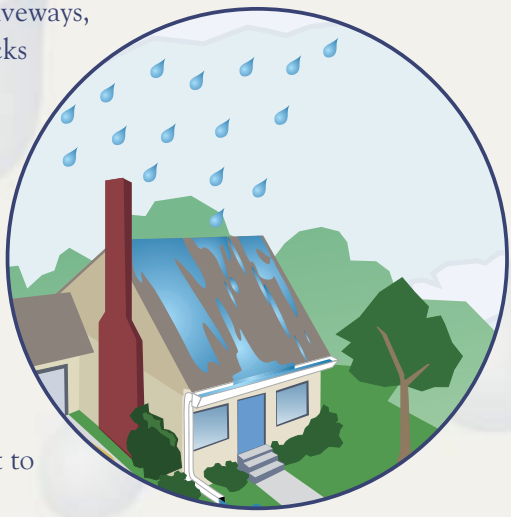
For More Information

U.S. Environmental Protection Agency
Nonpoint Source Control Branch (4503T)
1200 Pennsylvania Avenue, NW
Washington, DC 20460

www.epa.gov/nps

February 2003

As stormwater flows over driveways, lawns, and sidewalks, it picks up debris, chemicals, dirt, and other pollutants. Stormwater can flow into a storm sewer system or directly to a lake, stream, river, wetland, or coastal water. Anything that enters a storm sewer system is discharged untreated into the waterbodies we use for swimming, fishing, and providing drinking water. Polluted runoff is the nation's greatest threat to clean water.



By practicing healthy household habits, homeowners can keep common pollutants like pesticides, pet waste, grass clippings, and automotive fluids off the ground and out of stormwater. Adopt these healthy household habits and help protect lakes, streams, rivers, wetlands, and coastal waters. Remember to share the habits with your neighbors!

Healthy Household Habits for Clean Water

Vehicle and Garage

- Use a commercial car wash or wash your car on a lawn or other unpaved surface to **minimize** the amount of dirty, soapy water flowing into the storm drain and eventually into your local waterbody.

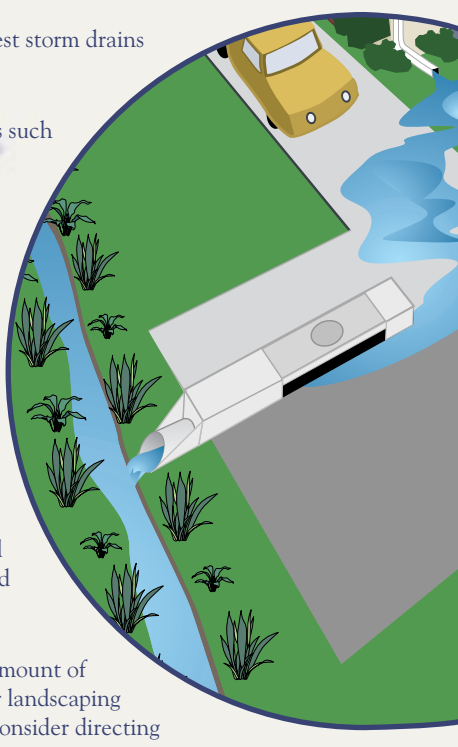
- Check your car, boat, motorcycle, and other machinery and equipment for leaks and spills. Make repairs as soon as possible. Clean up **spilled fluids** with an absorbent material like kitty litter or sand, and don't rinse the spills into a nearby storm drain. Remember to properly dispose of the absorbent material.
- **Recycle** used oil and other automotive fluids at participating service stations. Don't dump these chemicals down the storm drain or dispose of them in your trash.

Lawn and Garden

- Use pesticides and fertilizers **sparingly**. When use is necessary, use these chemicals in the recommended amounts. Avoid application if the forecast calls for rain; otherwise, chemicals will be washed into your local stream.
- Select **native** plants and grasses that are drought- and pest-resistant. Native plants require less water, fertilizer, and pesticides.
- **Sweep up** yard debris, rather than hosing down areas. Compost or recycle yard waste when possible.
- Don't overwater your lawn. Water during the **cool** times of the day, and don't let water run off into the storm drain.
- Cover piles of dirt and mulch being used in landscaping projects to prevent these pollutants from blowing or washing off your yard and into local waterbodies. **Vegetate** bare spots in your yard to prevent soil erosion.

Home Repair and Improvement

- Before beginning an outdoor project, locate the nearest storm drains and **protect** them from debris and other materials.
- **Sweep up** and properly dispose of construction debris such as concrete and mortar.
- Use hazardous substances like paints, solvents, and cleaners in the **smallest amounts possible**, and follow the directions on the label. Clean up spills **immediately**, and dispose of the waste safely. Store substances properly to avoid leaks and spills.
- Purchase and use **nontoxic**, **biodegradable**, **recycled**, and **recyclable** products whenever possible.
- **Clean** paint brushes in a sink, not outdoors. Filter and reuse paint thinner when using oil-based paints. Properly dispose of excess paints through a household hazardous waste collection program, or donate unused paint to local organizations.



- **Reduce** the amount of paved area and increase the amount of vegetated area in your yard. Use native plants in your landscaping to reduce the need for watering during dry periods. Consider directing downspouts away from paved surfaces onto lawns and other measures to increase infiltration and reduce polluted runoff.

Pet Care

- When walking your pet, remember to **pick up** the waste and dispose of it properly. Flushing pet waste is the best disposal method. Leaving pet waste on the ground increases public health risks by allowing harmful bacteria and nutrients to wash into the storm drain and eventually into local waterbodies.

Swimming Pool and Spa

- **Drain** your swimming pool only when a test kit does not detect chlorine levels.
- Whenever possible, drain your pool or spa into the **sanitary** sewer system.
- Properly store pool and spa chemicals to **prevent** leaks and spills, preferably in a covered area to avoid exposure to stormwater.

Septic System Use and Maintenance

- Have your septic system **inspected** by a professional at least every 3 years, and have the septic tank **pumped** as necessary (usually every 3 to 5 years).
- Care for the septic system drainfield by **not** driving or parking vehicles on it. Plant only grass over and near the drainfield to avoid damage from roots.
- Flush responsibly. Flushing household chemicals like paint, pesticides, oil, and antifreeze can **destroy** the biological treatment taking place in the system. Other items, such as diapers, paper towels, and cat litter, can **clog** the septic system and potentially damage components.

Storm drains connect to waterbodies!

Remember: Only rain down the drain!

For more information, visit
www.epa.gov/npdes/stormwater
or
www.epa.gov/nps

United States Environmental Protection Agency

EPA 833-B-03-003
January 2003

THE YEAR OF CLEAN WATER
Celebration & Recommitment

Internet Address (URL) • HTTP://www.epa.gov
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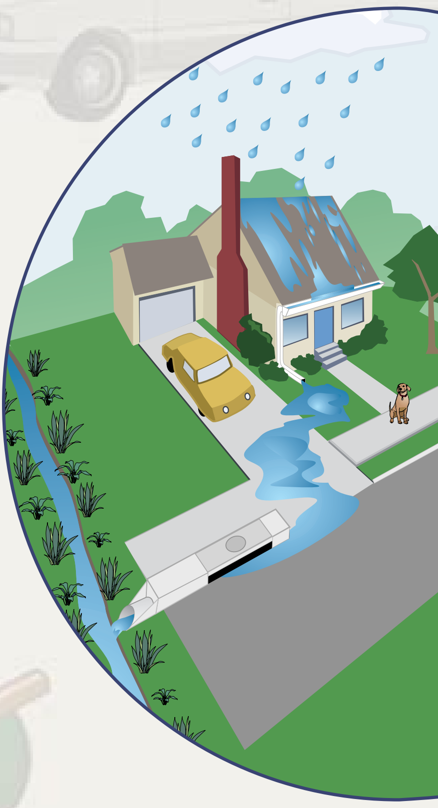
Make your home

The SOLUTION TO STORMWATER POLLUTION!

A homeowner's guide to healthy habits for clean water



United States Environmental Protection Agency

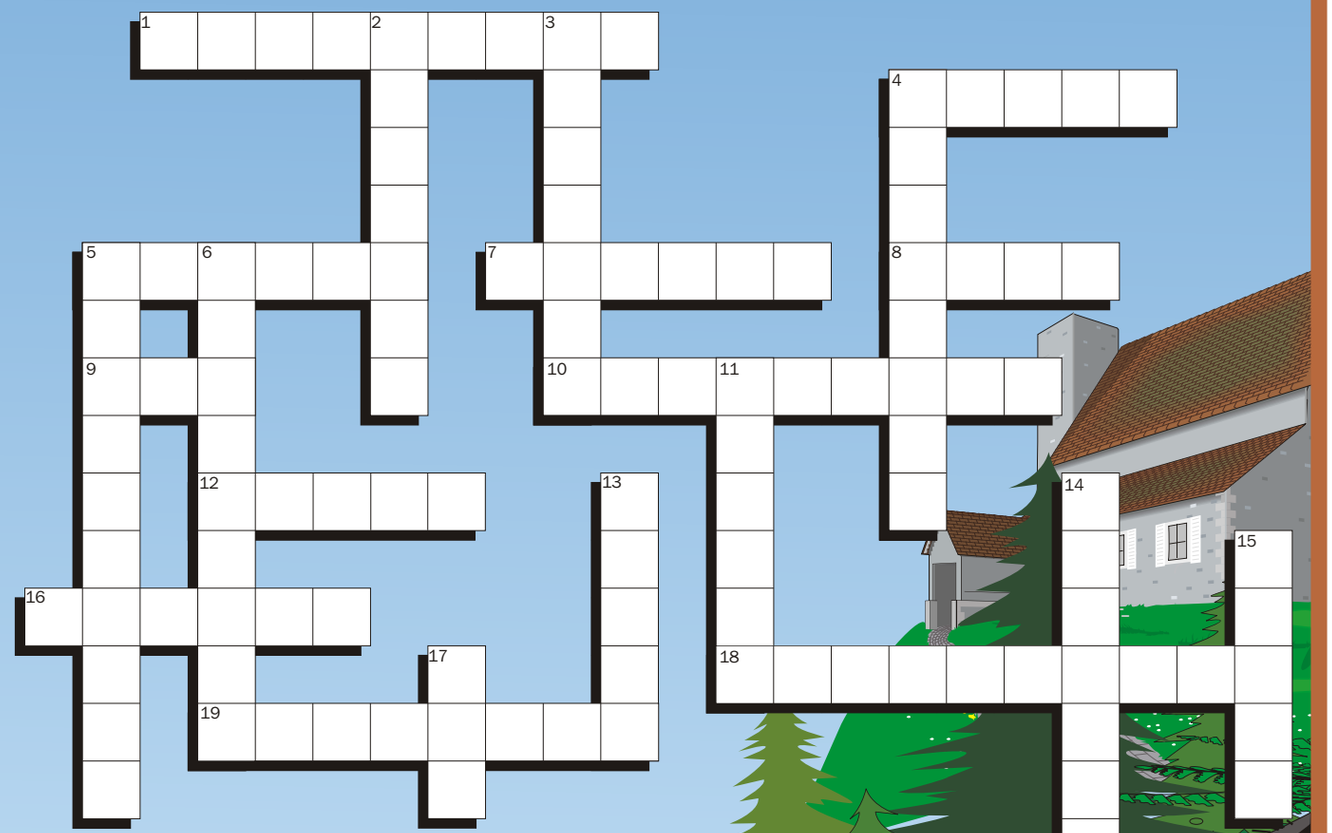
Take the Stormwater Runoff Challenge

Across:

1) The area of land that drains into an estuary, lake, stream, or groundwater is known as a _____.
4) The _____ of speeding boats can erode shorelines.
5) Maintaining your _____ tank will help to prevent bacteria and nutrients from leaking into groundwater and surface waters.
7) Wetland plants act like a natural water _____, removing harmful pollutants from stormwater runoff.
8) Leave your grass clippings on your _____ to reduce the need for commercial fertilizers.
9) A single quart of motor _____, if disposed of improperly, can pollute 2 million gallons of water.
10) Fertilizers and animal wastes contain _____ that "feed" algae and other aquatic plants harmful to water quality.
12) Polluted runoff from both rural and _____ sources has a significant impact on water quality.
16) Storm _____ don't always connect to sewage treatment plants, so runoff can flow directly to rivers, lakes, and coastal waters.
18) Follow directions carefully when applying _____ on your lawn—more isn't always better.
19) Polluted runoff (also called_____ source pollution) comes from so many places that it's hard to "pinpoint" a source.
20) Yard and vegetable food waste are suitable additions to a _____ pile.

Down:

2) Don't dump used motor oil into storm drains. _____ it!
3) _____ of soil from barren land can cloud nearby streams.
4) _____ prevent flooding, improve water quality, and provide habitat for waterfowl, fish, and wildlife.
5) Marking "Do Not Dump, Drains to Bay" on a _____ is one way to educate people about polluted runoff.
6) Excess sediment, nutrients, toxics, and pathogens are all types of runoff _____.
11) Polluted _____ is the nation's #1 water quality problem.
13) The cattail is one wetland _____ that helps purify polluted runoff.
14) Too much _____ in water can harm aquatic life.
15) Proper crop and animal management on _____ helps to control water pollution.
17) _____ impact development helps control stormwater pollution through conservation approaches and techniques.



Choices:

compost	nonpoint	sediment
drains	nutrients	septic
erosion	oil	storm drain
farms	plant	urban
fertilizer	pollution	wakes
filter	recycle	watershed
lawn	runoff	wetlands
Low		

EPA United States Environmental Protection Agency

For more information, please visit EPA's Polluted Runoff web site at www.epa.gov/nps

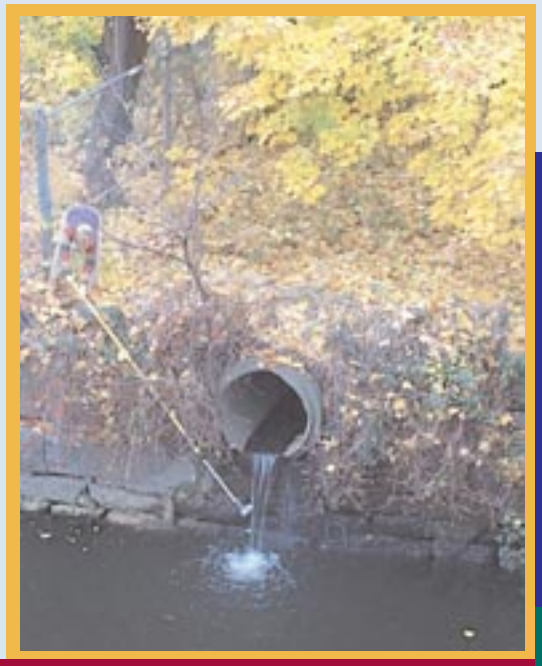
Printed with soy based inks on recycled paper.

APPENDIX B

MODEL ILLICIT DISCHARGE AND CONNECTION STORM WATER ORDINANCE (NEIWPCC)

ILLICIT DISCHARGE DETECTION AND ELIMINATION MANUAL

A Handbook for Municipalities



NEW ENGLAND INTERSTATE WATER POLLUTION CONTROL COMMISSION

January 2003

APPENDIX A

Model Illicit Discharge and Connection Stormwater Ordinance[1]

ORDINANCE NO. _____

SECTION 1. PURPOSE/INTENT.

The purpose of this ordinance is to provide for the health, safety, and general welfare of the citizens of (_____) through the regulation of non-storm water discharges to the storm drainage system to the maximum extent practicable as required by federal and state law. This ordinance establishes methods for controlling the introduction of pollutants into the municipal separate storm sewer system (MS4) in order to comply with requirements of the National Pollutant Discharge Elimination System (NPDES) permit process. The objectives of this ordinance are:

1)To regulate the contribution of pollutants to the municipal separate storm sewer system (MS4) by stormwater discharges by any user

(2) To prohibit Illicit Connections and Discharges to the municipal separate storm sewer system

(3) To establish legal authority to carry out all inspection, surveillance and monitoring procedures necessary to ensure compliance with this ordinance

SECTION 2. DEFINITIONS.

For the purposes of this ordinance, the following shall mean:

Authorized Enforcement Agency: employees or designees of the director of the municipal agency designated to enforce this ordinance.

Best Management Practices (BMPs): schedules of activities, prohibitions of practices, general good house keeping practices, pollution prevention and educational practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants directly or indirectly to stormwater, receiving waters, or stormwater conveyance systems. BMPs also include treatment practices, operating procedures, and practices to control site runoff, spillage or leaks, sludge or water disposal, or drainage from raw materials storage.

Clean Water Act. The federal Water Pollution Control Act (33 U.S.C. § 1251 et seq.), and any subsequent amendments thereto.

Construction Activity. Activities subject to NPDES Construction Permits. Currently these include construction projects resulting in land disturbance of 5 acres or more. Beginning in March 2003, NPDES Storm Water Phase II permits will be required for construction projects resulting in land disturbance of 1 acre or more. Such activities include but are not limited to clearing and grubbing, grading, excavating, and demolition.

Hazardous Materials. Any material, including any substance, waste, or combination thereof, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause, or significantly contribute to, a substantial present or potential hazard to human health, safety, property, or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Illegal Discharge. Any direct or indirect non-storm water discharge to the storm drain system, except as exempted in Section X of this ordinance.

Illicit Connections. An illicit connection is defined as either of the following:

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[1] USEPA. 2002. *Model Ordinances to Protect Local Resources: Illicit Discharges.* http://www.epa.gov/owow/nps/ordinance/discharges.htm

Any drain or conveyance, whether on the surface or subsurface, which allows an illegal discharge to enter the storm drain system including but not limited to any conveyances which allow any non-storm water discharge including sewage, process wastewater, and wash water to enter the storm drain system and any connections to the storm drain system from indoor drains and sinks, regardless of whether said drain or connection had been previously allowed, permitted, or approved by an authorized enforcement agency or,
Any drain or conveyance connected from a commercial or industrial land use to the storm drain system which has not been documented in plans, maps, or equivalent records and approved by an authorized enforcement agency.
Industrial Activity. Activities subject to NPDES Industrial Permits as defined in 40 CFR, Section 122.26 (b)(14).
National Pollutant Discharge Elimination System (NPDES) Storm Water Discharge Permit. means a permit issued by EPA (or by a State under authority delegated pursuant to 33 USC § 1342(b)) that authorizes the discharge of pollutants to waters of the United States, whether the permit is applicable on an individual, group, or general area-wide basis.
Non-Storm Water Discharge. Any discharge to the storm drain system that is not composed entirely of storm water.
Person. means any individual, association, organization, partnership, firm, corporation or other entity recognized by law and acting as either the owner or as the owner's agent.
Pollutant. Anything which causes or contributes to pollution. Pollutants may include, but are not limited to: paints, varnishes, and solvents; oil and other automotive fluids; non-hazardous liquid and solid wastes and yard wastes; refuse, rubbish, garbage, litter, or other discarded or abandoned objects, ordinances, and accumulations, so that same may cause or contribute to pollution; floatables; pesticides, herbicides, and fertilizers; hazardous substances and wastes; sewage, fecal coliform and pathogens; dissolved and particulate metals; animal wastes; wastes and residues that result from constructing a building or structure; and noxious or offensive matter of any kind.
Premises. Any building, lot, parcel of land, or portion of land whether improved or unimproved including adjacent sidewalks and parking strips.
Storm Drainage System. Publicly-owned facilities by which storm water is collected and/or conveyed, including but not limited to any roads with drainage systems, municipal streets, gutters, curbs, inlets, piped storm drains, pumping facilities, retention and detention basins, natural and human-made or altered drainage channels, reservoirs, and other drainage structures.
Storm Water. Any surface flow, runoff, and drainage consisting entirely of water from any form of natural precipitation, and resulting from such precipitation.
Stormwater Pollution Prevention Plan. A document which describes the Best Management Practices and activities to be implemented by a person or business to identify sources of pollution or contamination at a site and the actions to eliminate or reduce pollutant discharges to Stormwater, Stormwater Conveyance Systems, and/or Receiving Waters to the Maximum Extent Practicable.
Wastewater means any water or other liquid, other than uncontaminated storm water, discharged from a facility.

SECTION 3. APPLICABILITY.
This ordinance shall apply to all water entering the storm drain system generated on any developed and undeveloped lands unless explicitly exempted by an authorized enforcement agency.

SECTION 4. RESPONSIBILITY FOR ADMINISTRATION.
The_____ [authorized enforcement agency] shall administer, implement, and enforce the provisions of this ordinance. Any powers granted or duties imposed upon the authorized enforcement agency may be delegated in writing by the Director of the authorized enforcement agency to persons or entities acting in the beneficial interest of or in the employ of the agency.

SECTION 5. SEVERABILITY.
The provisions of this ordinance are hereby declared to be severable. If any provision, clause, sentence, or paragraph of this Ordinance or the application thereof to any person, establishment, or circumstances shall be held invalid, such invalidity shall not affect the other provisions or application of this Ordinance.

SECTION 6. ULTIMATE RESPONSIBILITY.

The standards set forth herein and promulgated pursuant to this ordinance are minimum standards; therefore this ordinance does not intend nor imply that compliance by any person will ensure that there will be no contamination, pollution, nor unauthorized discharge of pollutants.

SECTION 7. DISCHARGE PROHIBITIONS.

Prohibition of Illegal Discharges.

No person shall discharge or cause to be discharged into the municipal storm drain system or watercourses any materials, including but not limited to pollutants or waters containing any pollutants that cause or contribute to a violation of applicable water quality standards, other than storm water.

The commencement, conduct or continuance of any illegal discharge to the storm drain system is prohibited except as described as follows:

(1) The following discharges are exempt from discharge prohibitions established by this ordinance: water line flushing or other potable water sources, landscape irrigation or lawn watering, diverted stream flows, rising ground water, ground water infiltration to storm drains, uncontaminated pumped ground water, foundation or footing drains (not including active groundwater dewatering systems), crawl space pumps, air conditioning condensation, springs, non-commercial washing of vehicles, natural riparian habitat or wetland flows, swimming pools (if dechlorinated - typically less than one PPM chlorine), fire fighting activities, and any other water source not containing Pollutants.

(2) Discharges specified in writing by the authorized enforcement agency as being necessary to protect public health and safety.

(3) Dye testing is an allowable discharge, but requires a verbal notification to the authorized enforcement agency prior to the time of the test.

(4) The prohibition shall not apply to any non-storm water discharge permitted under an NPDES permit, waiver, or waste discharge order issued to the discharger and administered under the authority of the Federal Environmental Protection Agency, provided that the discharger is in full compliance with all requirements of the permit, waiver, or order and other applicable laws and regulations, and provided that written approval has been granted for any discharge to the storm drain system.

Prohibition of Illicit Connections.

(1) The construction, use, maintenance or continued existence of illicit connections to the storm drain system is prohibited.

(2) This prohibition expressly includes, without limitation, illicit connections made in the past, regardless of whether the connection was permissible under law or practices applicable or prevailing at the time of connection.

(3) A person is considered to be in violation of this ordinance if the person connects a line conveying sewage to the MS4, or allows such a connection to continue.

SECTION 8. SUSPENSION OF MS4 ACCESS.

Suspension due to Illicit Discharges in Emergency Situations

The _____ [authorized enforcement agency] may, without prior notice, suspend MS4 discharge access to a person when such suspension is necessary to stop an actual or threatened discharge which presents or may present imminent and substantial danger to the environment, or to the health or welfare of persons, or to the MS4 or Waters of the United States. If the violator fails to comply with a suspension order issued in an emergency, the authorized enforcement agency may take such steps as deemed necessary to prevent or minimize damage to the MS4 or Waters of the United States, or to minimize danger to persons.

Suspension due to the Detection of Illicit Discharge

Any person discharging to the MS4 in violation of this ordinance may have their MS4 access terminated if such

termination would abate or reduce an illicit discharge. The authorized enforcement agency will notify a violator of the proposed termination of its MS4 access. The violator may petition the authorized enforcement agency for a reconsideration and hearing.

A person commits an offense if the person reinstates MS4 access to premises terminated pursuant to this Section, without the prior approval of the authorized enforcement agency.

SECTION 9. INDUSTRIAL OR CONSTRUCTION ACTIVITY DISCHARGES.

Any person subject to an industrial or construction activity NPDES storm water discharge permit shall comply with all provisions of such permit. Proof of compliance with said permit may be required in a form acceptable to the _____ [authorized enforcement agency] prior to the allowing of discharges to the MS4.

SECTION 10. MONITORING OF DISCHARGES.

1. Applicability.
   This section applies to all facilities that have storm water discharges associated with industrial activity, including construction activity.

2. Access to Facilities.

(1) The_____ [authorized enforcement agency] shall be permitted to enter and inspect facilities subject to regulation under this ordinance as often as may be necessary to determine compliance with this ordinance. If a discharger has security measures in force which require proper identification and clearance before entry into its premises, the discharger shall make the necessary arrangements to allow access to representatives of the authorized enforcement agency.

(3) Facility operators shall allow the _____[authorized enforcement agency] ready access to all parts of the premises for the purposes of inspection, sampling, examination and copying of records that must be kept under the conditions of an NPDES permit to discharge storm water, and the performance of any additional duties as defined by state and federal law.

(3) The _____ [authorized enforcement agency] shall have the right to set up on any permitted facility such devices as are necessary in the opinion of the authorized enforcement agency to conduct monitoring and/or sampling of the facility's storm water discharge.

(4) The _____ [authorized enforcement agency] has the right to require the discharger to install monitoring equipment as necessary. The facility's sampling and monitoring equipment shall be maintained at all times in a safe and proper operating condition by the discharger at its own expense. All devices used to measure stormwater flow and quality shall be calibrated to ensure their accuracy.

(5) Any temporary or permanent obstruction to safe and easy access to the facility to be inspected and/or sampled shall be promptly removed by the operator at the written or oral request of the [authorized enforcement agency] and shall not be replaced. The costs of clearing such access shall be borne by the operator.

(6) Unreasonable delays in allowing the _____ [authorized enforcement agency] access to a permitted facility is a violation of a storm water discharge permit and of this ordinance. A person who is the operator of a facility with a NPDES permit to discharge storm water associated with industrial activity commits an offense if the person denies the authorized enforcement agency reasonable access to the permitted facility for the purpose of conducting any activity authorized or required by this ordinance.

(7) If the _____ [authorized enforcement agency] has been refused access to any part of the premises from which stormwater is discharged, and he/she is able to demonstrate probable cause to believe that there may be a violation of this ordinance, or that there is a need to inspect and/or sample as part of a routine inspection and sampling program designed to verify compliance with this ordinance or any order issued hereunder, or to protect the overall public health, safety, and welfare of the community, then the authorized enforcement agency may seek issuance of a search warrant from any court of competent jurisdiction.

SECTION 11. REQUIREMENT TO PREVENT, CONTROL, AND REDUCE STORM WATER POLLUTANTS BY THE USE OF BEST MANAGEMENT PRACTICES.

[Authorized enforcement agency] will adopt requirements identifying Best Management Practices for any activity, operation, or facility which may cause or contribute to pollution or contamination of storm water, the storm drain system, or waters of the U.S. The owner or operator of a commercial or industrial establishment shall provide, at their own expense, reasonable protection from accidental discharge of prohibited materials or other wastes into the municipal storm drain system or watercourses through the use of these structural and non-structural BMPs. Further, any person responsible for a property or premise, which is, or may be, the source of an illicit discharge, may be required to implement, at said person's expense, additional structural and non-structural BMPs to prevent the further discharge of pollutants to the municipal separate storm sewer system. Compliance with all terms and conditions of a valid NPDES permit authorizing the discharge of storm water associated with industrial activity, to the extent practicable, shall be deemed compliance with the provisions of this section. These BMPs shall be part of a stormwater pollution prevention plan (SWPP) as necessary for compliance with requirements of the NPDES permit.

SECTION 12. WATERCOURSE PROTECTION.

Every person owning property through which a watercourse passes, or such person's lessee, shall keep and maintain that part of the watercourse within the property free of trash, debris, excessive vegetation, and other obstacles that would pollute, contaminate, or significantly retard the flow of water through the watercourse. In addition, the owner or lessee shall maintain existing privately owned structures within or adjacent to a watercourse, so that such structures will not become a hazard to the use, function, or physical integrity of the watercourse.

SECTION 13. NOTIFICATION OF SPILLS.

Notwithstanding other requirements of law, as soon as any person responsible for a facility or operation, or responsible for emergency response for a facility or operation has information of any known or suspected release of materials which are resulting or may result in illegal discharges or pollutants discharging into storm water, the storm drain system, or water of the U.S. said person shall take all necessary steps to ensure the discovery, containment, and cleanup of such release. In the event of such a release of hazardous materials said person shall immediately notify emergency response agencies of the occurrence via emergency dispatch services. In the event of a release of non-hazardous materials, said person shall notify the authorized enforcement agency in person or by phone or facsimile no later than the next business day. Notifications in person or by phone shall be confirmed by written notice addressed and mailed to the _____ [authorized enforcement agency] within three business days of the phone notice. If the discharge of prohibited materials emanates from a commercial or industrial establishment, the owner or operator of such establishment shall also retain an on-site written record of the discharge and the actions taken to prevent its recurrence. Such records shall be retained for at least three years.

SECTION 14. ENFORCEMENT.

1. Notice of Violation.
   Whenever the _____ [authorized enforcement agency] finds that a

person has violated a prohibition or failed to meet a requirement of this Ordinance, the authorized enforcement agency may order compliance by written notice of violation to the responsible person. Such notice may require without limitation:
(a) The performance of monitoring, analyses, and reporting;
(b) The elimination of illicit connections or discharges;
(c) That violating discharges, practices, or operations shall cease and desist;
(d) The abatement or remediation of storm water pollution or contamination hazards and the restoration of any affected property; and
(e) Payment of a fine to cover administrative and remediation costs; and
(f) The implementation of source control or treatment BMPs.
If abatement of a violation and/or restoration of affected property is required, the notice shall set forth a deadline within which such remediation or restoration must be completed. Said notice shall further advise that, should the violator fail to remediate or restore within the established deadline, the work will be done by a designated governmental agency or a contractor and the expense thereof shall be charged to the violator.

SECTION 15. APPEAL OF NOTICE OF VIOLATION.
Any person receiving a Notice of Violation may appeal the determination of the authorized enforcement agency. The notice of appeal must be received within _ days from the date of the Notice of Violation. Hearing on the appeal before the appropriate authority or his/her designee shall take place within 15 days from the date of receipt of the notice of appeal. The decision of the municipal authority or their designee shall be final.

SECTION 16. ENFORCEMENT MEASURES AFTER APPEAL.
If the violation has not been corrected pursuant to the requirements set forth in the Notice of Violation, or , in the event of an appeal, within __ days of the decision of the municipal authority upholding the decision of the authorized enforcement agency, then representatives of the authorized enforcement agency shall enter upon the subject private property and are authorized to take any and all measures necessary to abate the violation and/or restore the property. It shall be unlawful for any person, owner, agent or person in possession of any premises to refuse to allow the government agency or designated contractor to enter upon the premises for the purposes set forth above.

SECTION 17. COST OF ABATEMENT OF THE VIOLATION.
Within __ days after abatement of the violation, the owner of the property will be notified of the cost of abatement, including administrative costs. The property owner may file a written protest objecting to the amount of the assessment within __ days. If the amount due is not paid within a timely manner as determined by the decision of the municipal authority or by the expiration of the time in which to file an appeal, the charges shall become a special assessment against the property and shall constitute a lien on the property for the amount of the assessment.
Any person violating any of the provisions of this article shall become liable to the city by reason of such violation. The liability shall be paid in not more than 12 equal payments. Interest at the rate of __ percent per annum shall be assessed on the balance beginning on the _st day following discovery of the violation.

SECTION 18. INJUNCTIVE RELIEF.
It shall be unlawful for any person to violate any provision or fail to comply with any of the requirements of this Ordinance. If a person has violated or continues to violate the provisions of this ordinance, the authorized enforcement agency may petition for a preliminary or permanent injunction restraining the person from activities which would create further violations or compelling the person to perform abatement or remediation of the violation.

SECTION 19. COMPENSATORY ACTION.
In lieu of enforcement proceedings, penalties, and remedies authorized by this Ordinance, the authorized enforcement agency may impose upon a violator alternative compensatory actions, such as storm drain stenciling, attendance at compliance workshops, creek cleanup, etc.

SECTION 20. VIOLATIONS DEEMED A PUBLIC NUISANCE.

In addition to the enforcement processes and penalties provided, any condition caused or permitted to exist in violation of any of the provisions of this Ordinance is a threat to public health, safety, and welfare, and is declared and deemed a nuisance, and may be summarily abated or restored at the violator's expense, and/or a civil action to abate, enjoin, or otherwise compel the cessation of such nuisance may be taken.

SECTION 21. CRIMINAL PROSECUTION.

Any person that has violated or continues to violate this ordinance shall be liable to criminal prosecution to the fullest extent of the law, and shall be subject to a criminal penalty of _____ dollars per violation per day and/or imprisonment for a period of time not to exceed ____ days.

The authorized enforcement agency may recover all attorney's fees court costs and other expenses associated with enforcement of this ordinance, including sampling and monitoring expenses.

SECTION 22. REMEDIES NOT EXCLUSIVE.

The remedies listed in this ordinance are not exclusive of any other remedies available under any applicable federal, state or local law and it is within the discretion of the authorized enforcement agency to seek cumulative remedies.

SECTION 23. ADOPTION OF ORDINANCE.

This ordinance shall be in full force and effect __ days after its final passage and adoption. All prior ordinances and parts of ordinances in conflict with this ordinance are hereby repealed.

PASSED AND ADOPTED this ____ day of _____, 19__, by the following vote:

APPENDIX C

ALTERNATE MODEL ILLICIT DISCHARGE CONNECTION ORDINANCES

"Illicit discharges to the municipal storm sewer system are comprised of non-storm water discharges that are expressly prohibited from the municipal storm sewer system unless the discharges have received all required federal, state and local permits including the National Pollutant Discharge Elimination System (NPDES) or is included in one of the following categories of discharges: water line flushing, landscape irrigation, diverted stream flows, rising ground waters, uncontaminated ground water infiltration, uncontaminated pumped groundwater, discharges from potable water sources, foundation drains, air conditioning condensation, irrigation water springs, water from crawl space sumps, footing drains, lawn watering, individual residential car washing, flows from riparian habitats and wetlands, de-chlorinated swimming pool discharges, and street wash water discharges, flows from fire fighting activities. If an illicit discharge to the municipal storm sewer system is detected, the owner of the discharge shall cease said discharge within seven calendar days. If the owner does not cease said discharge within seven calendar days, the City of Providence shall have the right to take whatever actions it deems necessary to correct the violations and to assert a lien on the subject property in an amount equal to the costs of the remedial actions. The lien shall be enforced in the manner provided or authorized by law for the enforcement of common law liens on personal property. The lien shall be recorded in the land evidence records of the City of Providence, and shall incur legal interest from the date of the recording. The imposition of any penalty shall not exempt the offender from compliance with the provisions of this ordinance, including revocation of the performance bond or assessment of a lien on the property."

APPENDIX D

TOWN OF WATERFORD, CT
JORDAN BROOK WATERSHED MANAGEMENT PLAN

The Jordan Brook Watershed Management Plan: Protecting Wetlands and Water Quality from Future Development

Abstract

This paper presents a comprehensive watershed management plan for the Jordan Brook watershed, a 21.2 square-kilometer (8.2 square-mile) coastal watershed located in a developing area of southeastern Connecticut on Long Island Sound. The plan provides a consistent framework for evaluating and controlling impacts to wetlands and watercourses from development in the watershed. The watershed management plan includes a baseline assessment of wetland resources throughout the watershed to identify particularly high value wetlands and wetlands which require special levels of protection. The recommended plan consists of five major components including stormwater quality controls, upland protection zones for wetlands and watercourses, groundwater recharge and peak flow requirements, open space protection, and water quality monitoring. A multi-tiered framework is recommended for determining the level of stormwater quality controls required for development projects in order to protect downstream receiving waters and wetlands. The recommended watershed management plan provides a framework which could be applied in other municipalities, especially those affected by EPA's recently promulgated Stormwater Phase II regulations.

Introduction

Research has demonstrated that urbanization is a major cause of degradation to wetlands and surface water quality and typically results in:

Increased volume of stormwater runoff,
Increased pollutant loadings from stormwater runoff,
Reduced infiltration and groundwater recharge,
Lower dry weather stream flows,
Degraded stream habitat, and
Reduced wetland moisture levels.

In most states, protection of wetlands and watercourses is regulated at the local level by municipalities. However, many communities do not have a consistent framework for evaluating wetland and watercourse impacts from development projects.

This paper presents a watershed management plan that provides a consistent framework for evaluating and controlling impacts to wetlands and watercourses from development. The plan was developed to protect wetland resources in the Jordan Brook watershed, a coastal watershed located in southeastern Connecticut on Long Island Sound. While the southern

portion of the watershed has been developed, large areas of the northern watershed remain undeveloped and are experiencing significant development pressure.

The Jordan Brook watershed management plan includes an evaluation of existing watershed resources, including wetlands, stream water quality, land use, and hydrologic conditions. A baseline assessment of wetland resources throughout the watershed was conducted to identify particularly high value wetlands and determine which wetlands require special levels of protection. A geographic information system (GIS)-based pollutant loading model was developed to evaluate subwatershed pollutant loadings, and a hydrological model was developed for the watershed to address stormwater quantity management issues.

The recommended watershed management plan consists of five major components:

Stormwater quality controls,
Upland protection zones for wetlands and watercourses,
Groundwater recharge and stormwater peak flow requirements,
Open space protection within the watershed, and
Water quality monitoring.

The following sections describe existing conditions in the Jordan Brook watershed, an evaluation of the watershed wetlands, and the major components of the recommended watershed management plan.

Watershed Conditions

The Jordan Brook watershed is a 21.2 square-kilometer (8.2 square-mile) watershed located in southeastern Connecticut. A majority of the watershed (94 percent) is located in the Town of Waterford, with a small portion of the watershed (6 percent) located in the City of New London. This watershed is oriented in a north-south direction, extending approximately 8.8 kilometers (5.5 miles) from its headwaters south to Jordan Cove which discharges to Long Island Sound.

The upper reaches of the Jordan Brook watershed are largely undeveloped. Jordan Brook crosses several highways, including Interstate-95, Interstate-395, and State Route 85 through the central portion of the watershed. Development and corresponding imperviousness increase as the brook flows south. Jordan Brook reaches its confluence with Nevins Brook approximately 400 feet upstream of Jordan Cove. Nevins Brook drains the southeastern portion of the watershed. Several smaller tributaries oriented in an east-west direction feed the central and southern portions of Jordan Brook. Figure 1 shows the location of the Jordan Brook watershed.

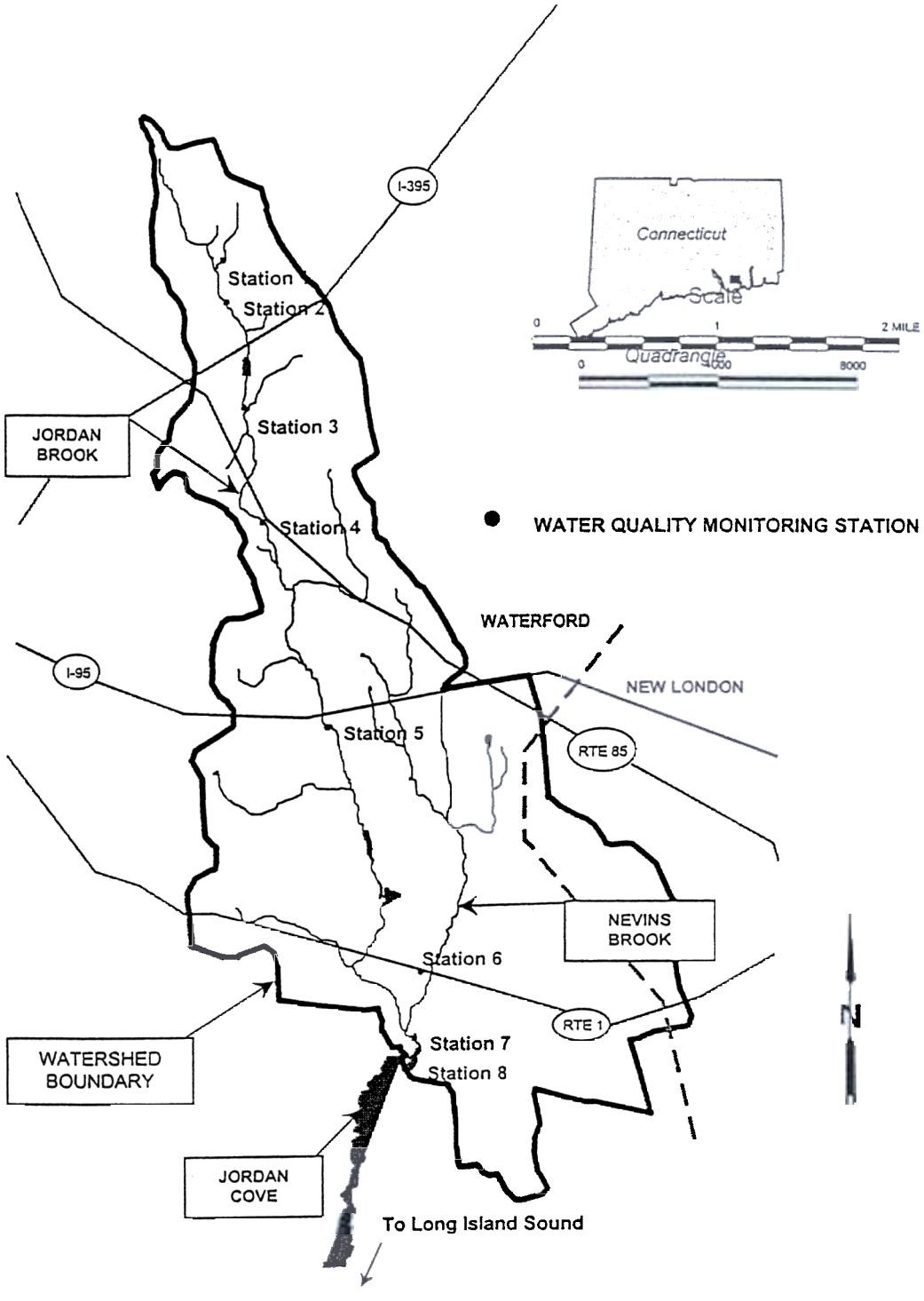

Figure 1. Location map of the Jordan Brook watershed.

Land Use

Watershed land use affects the quantity and quality of stormwater generated in the watershed. Factors such as impervious area, drainage system, development characteristics, traffic volume, air emissions, and exposure of other pollutant sources are dependent on land

use. Approximately 76 percent of the watershed consists of a combination of undeveloped, single family residential, and public facility land uses. Approximately 17 percent of the watershed consists of commercial, industrial and multi-family land uses. Highways and roads comprise approximately 7 percent of the watershed area.

Water Quality

Surface water quality in the watershed generally meets "fishable and drinkable" (Class A) standards established for the State of Connecticut. While surface water quality still meets standards, in-stream concentrations of pollutants increase downstream as development and impervious surfaces increase. Overall watershed imperviousness is approximately 12 percent, while highly developed areas in the southern portion of the watershed are up to 30 percent impervious. These levels of imperviousness are generally within the widely-cited range of impervious coverage values (10 to 30 percent) at which impacts to downgradient water resources are observed (Booth and Reinfelt 1993; Shaver and Maxted 1996; Schueler 1993; Arnold and Gibbons 1996). Additionally, modeling of future pollutant loads indicates that stormwater pollutant loadings could increase by more than 100 percent for zinc and between 30 and 50 percent for phosphorous, copper, and lead under a future full build-out scenario.

Groundwater

The Jordan Brook watershed is underlain by areas of stratified drift that could serve as groundwater aquifers. Potential groundwater aquifers are generally concentrated along Jordan Brook, Nevins Brook, and their associated tributaries. A widespread area of thick stratified drift deposits is located in the southern portion of the watershed. The Town of Waterford has identified this area as a potential public water supply source. However, this area is also susceptible to groundwater contamination from point and non-point sources of pollution due to the high degree of development in the area.

Wetlands Evaluation

A field survey and evaluation of wetlands and watercourses in the watershed was performed in April 1998. The purpose of this survey was to develop a description and biological evaluation of significant surface water and wetland ecosystems within the Jordan Brook watershed in order to identify particularly high value wetlands and wetlands which require special levels of protection.

Wetlands within the Jordan Brook watershed were evaluated using an adaptation of the method developed by the Connecticut Department of Environmental Protection (CTDEP) (Ammann, et al., 1991). This method was designed for use by municipalities as a planning tool and consists of a scientifically defensible numerical scoring system that can

be used to compare the relative value of all wetlands within the same watershed. Wetland value rankings (Low, Average, High or Very High), which reflect the comparative value of wetlands within the watershed, were assigned to each wetland based upon the numerical scores.

The evaluation also identified wetlands within the watershed that would benefit greatly by improvements in the quality of stormwater flowing into them. These wetlands are either

Located in undeveloped areas and would be significantly impacted by degraded stormwater from road runoff or construction related sedimentation,
Degraded surface waters which flow through developed areas and would be significantly enhanced by water quality improvements, or
Wetlands deemed especially sensitive and meriting all possible measures of protection or preservation.

Recommended Plan

A recommended watershed management plan was developed to control wetland and watercourse impacts that may be caused by new development or altered land use activities in the Jordan Brook watershed. The goal of this plan is to maintain or improve existing ecological conditions in watershed wetlands and watercourses while not unreasonably restricting future development. In general, this plan controls several types of potential impacts associated with development. These potential impacts include:

Degradation of surface water quality and wetland habitat
Reduction of groundwater base flows
Increase in stream flood flows

The following are the major elements of the recommended watershed plan.

Stormwater Quality Controls

A stormwater quality control selection methodology was recommended for future development projects to protect watershed wetlands and water quality. This recommended methodology utilizes a tiered approach to define the appropriate level of stormwater controls that would be necessary to protect downstream resources based on the type and size of development and its potential impacts. Three tiers of stormwater controls were recommended, which are triggered based on development characteristics such as level of imperviousness, size of the development, land use, and also based on receiving water/wetland resources.

Base Level Controls

Base level controls are intended to provide baseline protection against degradation of downstream resources across the entire watershed. Base level controls provide gross contaminant and sediment reduction and serve to dissipate the potential erosive energy of stormwater runoff. A base level of stormwater quality controls would be required for all new developments. Redevelopments that result in land use changes or modifications to the storm drainage system would also be required to implement these controls as an opportunity to improve watershed water quality. Base level controls would not be required for single-family houses or residential subdivisions with four or fewer lots that have no new roads, provided that any discharge from the subdivision would not affect a wetland or watercourse that is sensitive to water quality. Development that is part of a phased development project would not be exempt from base level controls.

Base level controls would be required for diffuse runoff and point discharges and would consist of, at a minimum, one or a combination of stormwater Best Management Practices (BMPs) such as vegetated buffer strips, oil/particle separators, level spreaders, sediment basins (with floatables trap), infiltration basins, and vegetated drainage swales. These measures provide a minimum level of stormwater treatment by promoting infiltration and filtration of stormwater pollutants by vegetation or by removal of gross solids and floatables.

Secondary and Tertiary Controls

In addition to the base level controls required for all future development, more stringent stormwater quality controls would be required for developments that have the potential to generate higher pollutant loadings. Similarly, stormwater discharges to wetlands or watercourses identified as being sensitive to water quality would also require an additional level of protection to limit pollutant impacts to these resources. Under this stormwater quality control selection methodology, two levels of additional controls may be required for stormwater discharges that meet these criteria.

Secondary controls would require implementation of stormwater BMPs that remove at least 80 percent of the total suspended solids (TSS) load. The 80 percent TSS removal requirement applies to post-development conditions after a site is stabilized. Examples of BMPs which have been shown to achieve 80 percent TSS removal on average include:

Extended detention pond (equipped with sediment forebay)
Wet pond (equipped with sediment forebay)
Constructed wetland
Sand or organic filter

Devices using swirl/vortex technology
Other proprietary technologies demonstrated to provide 80 percent TSS removal

Floatables such as oil and grease could be removed using a base level control such as an oil/water separator in combination or in addition to the above measures.

Tertiary controls has the goal of no net increase in future pollutant loadings as compared to existing conditions, considering maximum attainable reductions in stormwater pollutant loadings. This level of controls would require at least 80 percent removal of TSS, removal of floatables, and demonstration of no net increase in loadings of other pollutants suspected of being present in the stormwater (e.g., nutrients, metals, coliform bacteria) through the use of a stormwater pollutant loading model. Required stormwater controls would likely consist of one or a series of state-of-the-art stormwater BMPs. This level of control would be required only for those developments with the greatest potential for significant pollutant loadings or potential impacts to wetlands or watercourses which are sensitive to water quality.

Selection Criteria

Selection of the appropriate level of stormwater quality controls for a particular development would be based on consideration of the following criteria:

Receiving water resource - Wetlands or watercourses which are sensitive to water quality would be protected by providing the maximum attainable level of stormwater controls. Tertiary stormwater quality controls would be required for all developments which discharge to such wetlands or watercourses as a point source, either directly or via a storm drainage system, or as uniform, diffuse flow. Stormwater discharges to all other wetlands or watercourses would require base level or secondary controls, depending on the other selection criteria.

Land use of proposed development - Tertiary controls would be required for developments with industrial, high-intensity commercial, or other land uses with the potential for significant pollutant loadings (e.g., gas stations, vehicle service facilities, salt storage areas, marinas).

Level of imperviousness - Developments with less than 10 percent impervious area would require base level controls. Developments with more than 10 percent impervious area would require secondary stormwater quality controls.

Size of development - Developments with greater than five acres of disturbed area would require secondary stormwater quality controls, which is consistent with the CTDEP's existing stormwater general permit that requires projects that result in more

than five acres of disturbance to install controls with a goal of at least 80 percent TSS reduction.

Stormwater quality control selection thresholds for each of these criteria are summarized in Table 1. The most stringent of the applicable control levels would dictate the required level of controls for a particular development project.

Table 1. Stormwater quality control level selection methodology.

Selection Criteria	Stormwater Quality Control Level		
	Base Level Controls	Secondary Controls	Tertiary Controls
Receiving Water Resource	All other wetlands/watercourses	All other wetlands/watercourses	Discharge to wetland/ watercourse sensitive to water quality
Land Use	All other land uses	All other land uses	Facilities with potential for extremely high pollutant loadings
Percent Impervious	0 to 10 percent	Greater than 10 percent	—
Size of Development	0 to 5 acres	Greater than 5 acres	—

Upland Protection Zones

One of the most effective ways to protect wetlands of special significance is to designate an Upland Protection Zone of undisturbed vegetation along the wetland boundary. Natural vegetation stabilizes transitional soils between uplands and wetlands, thereby preventing erosion and sedimentation. The ability to anchor soils on steep slopes is especially important. The vegetation slows the passage of stormwater, allowing infiltration into the soil, thereby removing nutrients and other pollution. Edge habitats in uplands bordering wetlands are also heavily utilized by wildlife, especially birds. An Upland Protection Zone 50 feet in width is recommended for all wetlands, and a 100-foot width is recommended adjacent to perennial streams. These widths are believed adequate to prevent soil erosion on sloping land, provide upland nesting sites for birds, and provide an unbroken travel corridor for mammals, reptiles and amphibians.

No structures, other than bridge supports, culvert abutments, stormwater control devices, or utility lines would be allowed in the Upland Protection Zone. Site-specific

factors which should be considered in adjusting the width of an upland protection zone include the significance of the wetland resource, land slope, soil type, and flood plain limits.

Groundwater Recharge and Peak Stormwater Flows

The watershed management plan recommends that new developments maintain pre-development groundwater base flows. One means of potentially accomplishing this recommendation would be for new developments to infiltrate "clean" roof runoff from non-metallic roofs. Alternatively, new developments could be allowed to infiltrate less water by demonstrating through an engineering evaluation of actual site conditions that less water can be infiltrated and still maintain groundwater base flows.

Increased development could result in increased impervious surfaces and, without adequately sized stormwater controls, will increase peak stormwater flows and increase the volume and rate at which runoff will drain from the site. In order to control this potential impact from new development, the plan recommends that developers include detention/retention devices such that pre-development peak discharge rates from the site are maintained. Some developments that have little potential to significantly impact off-site peak discharge rates could be exempted from this requirement. The developments that could be exempted are small projects that would generate a net increase of peak stormwater flows of less than 1 cubic foot per second and where this level of control may be overly burdensome and include:

Single family residences,
Subdivisions with four lots or less with no new public/private roads,
A project with a net increase of less than 5,000 square feet of impervious surfaces.

The plan requires that new development projects demonstrate no net increase in pre-development peak flows from the site for proposed conditions and compare total proposed peak discharge from the site to existing peak flows at downstream points-of-concern (culverts, wetlands, floodprone areas, etc.). If the total proposed peak discharge from the site exceeds 10 percent of the existing peak flow at a downstream point-of-concern, the project must demonstrate no net increase in pre-development peak flows at each point-of-concern between the site and the downstream most point-of-concern.

Open Space Protection

While encroachment of new development into wetland areas can be prevented through existing regulations, upland areas can be developed, within limitations, unless that land is controlled/or owned by an entity (public or private) that prevents its development. The intent and benefit of maintaining adjacent upland areas is for maintenance of wetland

hydrology and ecological setting. The watershed management plan recommends that the Town of Waterford continue to acquire upland open space that would improve the value of wetlands in the watershed.

Water Quality Monitoring

The plan recommends continued surface water quality monitoring in the watershed to evaluate trends in water quality and the overall success of the watershed management program. Biannual wet and dry weather sampling of Jordan Brook is recommended to monitor conventional water quality parameters. Water quality monitoring of stormwater BMPs is also recommended to confirm that new developments have appropriate controls. Initial and long-term post-construction monitoring of BMPs is recommended.

Conclusions

The watershed management plan described in this paper provides a framework which could be applied to watershed management in other municipalities, especially those affected by EPA's recently promulgated Stormwater Phase II regulations which will require expanded stormwater controls for small- to mid-size municipalities. Field evaluation of wetlands and water resources in the watershed is a critical component of this framework, which prioritizes the required level of stormwater quality controls based on a number of site-specific factors, including the relative value of the receiving water resource. The success of this watershed management plan will be measured through ongoing water quality and stormwater BMP monitoring, as well as future wetlands evaluations.

References

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APPENDIX E

DRAFT MODEL STORM WATER CONTROL ORDINANCE

Draft
Model Stormwater Control Ordinance

Section 1

1.1 Purpose

Unmitigated stormwater from areas altered by development may pose public health and safety threats. Potential contaminants in stormwater runoff may include suspended solids, nitrogen, phosphorus, hydrocarbons, heavy metals, pathogenic organisms (bacteria and viruses), and road salts. Stormwater runoff may impact any water resource—surface water, groundwater and wetlands—and is often cited as the most significant contributor of nonpoint source water pollution.

Best management practices for stormwater management help to prevent adverse impact. However, practices must be designed, installed and maintained properly to ensure their effective function. Practices that do not function properly may degrade water quality as well as present nuisance and safety hazards.

This ordinance establishes the administrative mechanisms necessary for *[name of municipality]* to ensure proper stormwater management. The ordinance is written to work in conjunction with current state regulations.

1.2 Applicability

This ordinance shall apply to all development occurring within *[name of municipality]*. No person shall engage in land development activities without receiving approval from *[name of governing body]*, unless specifically exempted by Section 1.3 of this ordinance.

1.3 Exemptions

The following activities do not require written approval pursuant to this ordinance:

(A) Agricultural land management activities carried out in accordance with a conservation management plan that has been approved by the Natural Resources Conservation Service.

(B) Additions or modifications to existing single-family residential structures.

(C) Grading, as a maintenance measure or for landscaping, on contiguous areas of developed land, parcels and lots, which in aggregate do not exceed five thousand (5,000) square feet.

1.4 Variance

The _____ (municipal board or official) reviewing an application under this ordinance may:

(A) Vary requirements of this ordinance when strict implementation of the requirements of this ordinance create an unnecessary hardship or are not feasible.

(B) Allow use of an innovative management practice where strict adherence to existing criteria would be costly or of negligible environmental benefit.

1.5 Compatibility with Other Enforceable Policies

This ordinance shall not obviate or supercede any other federal, state or local regulations or statutes. The provisions of this ordinance shall be held to be minimum requirements for the promotion of public health, safety and general welfare. If a provision of this ordinance imposes a standard different from any related regulation or statute, the provision that imposes the more protective standard shall be observed.

1.6 Severability

If the provisions of any article, section, subsection, paragraph, subdivision or clause of this ordinance shall be judged invalid by court of competent jurisdiction, such order of judgment shall not affect or invalidate the remainder of any article, section, subsection, paragraph, subdivision or clause of this ordinance.

Section 2--Definitions

The following definitions apply to this ordinance.

AGRICULTURAL DEVELOPMENT: means land uses normally associated with the production of food, fiber and livestock for sale. For purposes of this ordinance, such uses shall not include the development of land for the processing or sale of food and the manufacturing of agriculturally related products.

BEST MANAGEMENT PRACTICE (BMP): means a method for pollution

management, which is deemed to provide the best available treatment or control of a pollution source such as stormwater.

DETENTION BASIN: means an embankment and associated space for impoundment of water or, alternatively, the space for impoundment partially or entirely created by excavation rather than by embankment, in either case designed to temporarily retain stormwater runoff.

FLOOD HAZARD AREAS: means the floodway and flood fringe areas determined or delineated by the Department of Environmental Management.

FLOOD PLAIN: means the flood hazard areas of streams delineated the Department of Environmental Management and areas inundated by the 100-year flood in areas not delineated by the Department of Environmental Management.

FLOODWAY: means the channel of a natural stream and portions of the flood hazard areas adjoining the channel, which are reasonably required to carry and discharge the flood water or flood flow of any natural stream.

INFILTRATION BASIN: means a detention facility, which is not an injection well, that is designed to gradually filter and pass retained water to the subsurface.

NONPOINT SOURCE POLLUTION: means pollution from any source that is not discernible, confined and discrete. Potential sources of nonpoint pollution include, but are not limited to, stormwater runoff, agriculture, silviculture, mining, construction, septic systems and urban development.

RECHARGE: means the replenishment of underground water reserves.

STORMWATER RUNOFF: means flow on the surface of the ground, resulting from precipitation.

WET BASIN: means a detention basin designed to retain some water on a permanent basis.

WETLANDS: means an area, as defined by the Rhode Island General Laws and as determined by the Department of Environmental Management or the Coastal Resources Management Council, which is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support--and under normal circumstances does support--a prevalence of vegetation typically adapted for life in

saturated soil conditions, commonly known as hydrophytic vegetation.

Section 3—Submissions and Approvals

In accordance with Section 1.2 of this ordinance, all persons must obtain approval from *(name of municipal review board)* prior to engaging in any land development activities, unless exempted by Section 1.3 of this ordinance. To obtain approval applicants must demonstrate compliance with all policy, standards and requirements of this ordinance to the satisfaction of the *(name of municipal review board).* Applicants may demonstrate compliance via submission of materials and documentation in accordance with this section.

3.1 Stormwater Management Plan

All applicants shall provide a stormwater management plan as part of the submission for approval. Stormwater management plans shall incorporate the following.

(A) A discussion of protection of environmental resource functions and values in accordance with Section of this ordinance.

(B) A discussion of best management practices employed, in accordance with this ordinance, both during construction and post construction.

(C) A discussion of best management practice maintenance to be used, in accordance with this ordinance, both during construction and post construction.

3.2 Site Plan

All applicants shall provide a site plan as part of the submission for approval. Site plans shall incorporate the following.

(A) A map of existing site conditions in accordance with Section of this ordinance.

(B) Maps of the site showing all phases of construction of the proposed project in accordance with Section of this ordinance.

(C) Site planning calculations in accordance with Section of this ordinance.

(D) A narrative description of the proposed project in accordance with

Section of this ordinance.

3.3 Maintenance Agreement

All applicants shall provide a maintenance agreement as part of the submission for approval in accordance with Section of this ordinance.

3.4 Performance Surety

All applicants shall provide performance surety as part of the submission for approval. The performance surety shall incorporate the following.

(A) A letter of credit in accordance with Section of this ordinance.

(B) Evidence of posting in accordance with Section of this ordinance.

3.5 Processing of Submittals

Procedures for processing of submittals shall be as follows.

(A) Submittals for approval shall be provided to *[name of municipal governing board]* for review, processing and approval. *[Number of copies to be provided by applicant]* copies of the submittal shall be provided.

(B) All applicants shall provide an application fee as part of the submittal. Application fees shall be charged in accordance with Section10 of this ordinance.

(C) A review of the submittal shall be conducted by *[name of municipal governing board]* within *[number of days required for review]* days from the date of receipt. Written comments shall be provided to the applicant regarding the completeness of the submittal and requesting further information as necessary.

(D) If *[name of municipal governing board]* determines the submittal to be in compliance with the requirements of this ordinance, a permit may be issued. If the *[name of municipal governing board]* determines the submittal does not fully conform to the requirements of this ordinance a written denial shall be issued with an explanation for the denial.

(E) Any applicant who believes that a submission for approval has been denied without sufficient cause and that the submittal fully conforms with this ordinance may petition *[name of municipal*

governing board] in writing. If the applicant is again denied, the denial may be appealed to *[name of municipal appeals board]*, whose decision shall be final.

Section 4--Protection of functions and values

4.1 Wildlife And Wildlife Habitat Values

Stormwater management plans shall address protection of areas that provide wildlife habitat benefits.

4.2 Recreation and Cultural Values

Stormwater management plans shall address protection of areas that provide recreational, cultural or aesthetic values.

4.3 Flood Protection

Stormwater management plans shall demonstrate that a proposed project provides for protection of life and property from flooding and flood flows. Water quantities must be controlled in accordance with the *Rhode Island Stormwater Design and Installation Standards Manual*, as amended, or a municipally approved regional stormwater management plan for the watershed in which the development site is located. Stormwater management plans shall demonstrate incorporation of the following standards into the proposed project:

(A) Control and maintenance of postdevelopment peak discharge rates from the 2-year and 25-year storm events and predevelopment levels.

(B) Downstream analysis of the 100-year storm event and control of the peak discharge rate for the 100-year storm to mitigate significant downstream impacts.

(C) Discharge from any stormwater facility must be conveyed through properly constructed watercourses to provide for nonerosive flows during all storm events. The proposed stormwater conveyance system consisting of open channels, pipes, and other conveyance devices shall at a minimum accommodate the runoff from a 10-year storm event. The stormwater conveyance system must provide for nonerosive flows to receiving waters.

4.4 Surface Water And Groundwater

Stormwater management plans shall demonstrate that during develop

and postdevelopment, all receiving waters will be recharged in a manner closely resembling predevelopment conditions and that the developed site will retain hydrological conditions that closely resemble of those prior to disturbance.

Section 5—Technical Standards

All applicants are required to develop and submit a stormwater management plan. All stormwater management plans must address stormwater management on a site-by-site basis and all requirements of this ordinance. All stormwater management practices shall be consistent with the *Rhode Island Stormwater Design and Installation Standards Manual* and the *Rhode Island Soil Erosion and Sediment Control Handbook*, as amended. The following general standards and policies are also requirements of the state. However, a state permit, assent, or other approval does not necessarily assure similar municipal approval. In situations where the state determines that a project is below regulatory threshold or outside state jurisdiction, *[name of municipality]* will continue to require that the following policies and standards be upheld.

All development shall incorporate appropriate and practical stormwater management. Stormwater management shall be described by applicants in a stormwater management plan and submitted in accordance with Section # of this ordinance. Stormwater management plans shall be prepared in accordance with Appendix A of this ordinance and demonstrate the following to maximum extent practicable.

5.1 Soil Erosion And Sediment Control

Stormwater management plans shall demonstrate soil erosion and sediment control in accordance with the *Rhode Island Soil Erosion and Sediment Control Handbook*, as amended. Soil erosion and sediment control must incorporate the following:

(A) Fit development to the terrain.

(B) Divide the site into drainage areas to determine how runoff will travel over the site.

(C) Cluster buildings together to the extent allowable by municipal ordinances and regulations.

(D) Minimize impervious areas.

(E) Minimize disturbance of the natural drainage system.

(F) Keep land disturbance to a minimum.

(G) Stabilize disturbed areas.

(H) Keep runoff velocities low.

(I) Minimize the grades of slopes.

(J) Protect disturbed areas from stormwater runoff.

(K) Install perimeter sediment control practices.

(L) Prepare a thorough maintenance and inspection plan.

(M) Assign responsibility for a maintenance program.

(N) Coordinate with other development in the watershed.

5.2 Performance Standards

(A) Stormwater management plans shall incorporate best management practices for water quality control, which in combination are demonstrated to reduce the average annual total suspended solids in postdevelopment runoff by eighty percent (80%). Development in drinking water supply watersheds may be held to higher standards. To meet standards the following must be incorporated:

(B) The water quality design volume shall be defined as one inch (1") of runoff over all impervious surfaces or 0.4 inches of runoff over pervious areas. For purposes of computing runoff, all lands in the site shall be assumed, prior to development, to be in good hydrologic condition (if the lands are pastures, lawns or parks), with good cover (if the lands are woods), or with conservation treatment (if the land is cultivated), regardless of conditions existing at the times of computation. For lands to be considered cultivated, it shall have been used for such purposes uninterruptedly for a period of at least 10 years prior to the time of computation. If such uninterrupted use has not occurred or cannot be satisfactorily demonstrated, woods or brush shall be assumed to be the predeveloped land condition. All significant surface storage including open waters, ponding factors and hedgerows shall be accounted for in computing predevelopment runoff.

(C) Wet ponds must have a permanent pool volume equal to the water quality volume as described in item A.

(D) Extended detention dry ponds must detain the water quality volume over a 36-hour period (brim drawdown time).

(E) Infiltration methods must be designed to retain and exfiltrate the water quality volume over a maximum 72-hour period.

(F) All runoff up to the water quality design storm shall be controlled by one or more of the stormwater management best management practices as described in the *Rhode Island Stormwater Design and Installation Standards Manual*, as amended.

(G) Alternative land use, site design, source controls and structural controls may be used when they can be shown to provide equal or greater water quality protection, have acceptable maintenance requirements, and will be monitored to demonstrate their effectiveness on site.

5.3 Disallowed Stormwater Best Management Practices

(A) The following stormwater best management practices shall not be allowed in *[name of municipality]*, regardless of any other federal, state, regional or local policy or regulation. (list of disallowed best management practices)

(B) The placement of detention basins and other stormwater structures within a floodplain shall be avoided. If there is no alternative, the applicant must show what effects, if any, the tailwaters created by the floodplain will have on the outflow and effective storage capacity of the detention facility.

5.4 Safety

Safety measures are to be incorporated in the design of all stormwater and infiltration control projects. These may include but are not limited to fencing, warning signs/stadia rod indicating depth at the deepest point, outlet structures designed to limit public access, and aquatic benches in basins containing permanent or standing water levels.

5.5 Facilitation of Maintenance

Stormwater management facilities must be designed to operate with minimal maintenance. Facilities that require maintenance shall be designed to minimize the need for regular maintenance, facilitate required maintenance, and ensure accessibility of components that require maintenance. At a minimum, all stormwater management plans must incorporate best

management practices with appropriate maintenance design in accordance with the *Rhode Island Stormwater Design and Installation Standards Manual*, as amended; or the *Rhode Island Soil Erosion and Sediment Control Handbook*, as amended. In addition, the following maintenance design standards and policies must be incorporated into management practice design and stormwater management plans.

(A) Strong, durable and noncorroding materials, components, and fasteners shall be incorporated in facility design and demonstrated in stormwater management plans. These include, but are not limited to, the following:

1. Lightweight noncorroding metals such as aluminum for trash racks, orifice plates, anti-seep collars, and access hatches.

2. Hardy, disease resistant grasses for bottoms and side slopes (as prescribed by Soil Erosion and Sediment Control Standards administered by the local Soil Conservation District).

3. Reinforced concrete for outlet structures and inlet headwalls; PVC piping for culverts, and riprap and gabions for channel and outlet linings.

(B) Stormwater management facility outlets shall be designed to function normally without manual, electric or mechanical controls.

5.6 Nuisance Control

All stormwater management plans and best management practices shall incorporate nuisance control as appropriate. The following are the required policies and minimum standards:

(A) To control weeds, disease and pests, a regularly scheduled program of mowing and trimming of bottoms, side-slopes and embankments shall be specified and conducted.

(B) Stormwater management facilities shall be designed to minimize propagation of insects, particularly mosquitoes.

5.7 Landscaping

Stormwater management facilities shall be designed in a harmonious and attractive manner that visually compliments the natural environment of the development site as well as the postdeveloped condition.

(A) Use of landscaping as a method of reducing runoff and preventing pollutant inputs.

(B) Application of a minimal disturbance and minimal maintenance policy for landscaping. Where practical, clearing or site grading should only occur on land required for the structure and its associated utilities, drives, walks, and active recreational facilities. Following construction, unbuilt disturbed areas shall be revegetated with low- and no-maintenance, indigenous species.

(C) Where land disturbance is necessary and existing vegetation is removed, alternative landscaping, which encourages ground coverings, shade trees and shrubbery should be used. Landscaping should incorporate native vegetation to the maximum extent practicable. Use of lawns should be avoided where conditions indicate potential problems with turf establishment and maintenance.

(D) Appropriate fertilizer selection and application for vegetation reestablishment and landscaping.

Section 6—Maintenance Requirements for Best Management Practices

6.1 Routine Maintenance and Repair Procedures

(A) Preventative maintenance procedures are required to maintain the intended operation and safe condition of the stormwater management facility by greatly reducing the occurrence of problems and malfunctions. To be effective, preventative maintenance shall be performed on a regular basis and include such routine procedures as training of staff, periodic inspections, grass cutting (at least twice a year) and fertilizing, upkeep of moving parts, elimination of mosquito breeding habitats, and pond maintenance. Disposal of sediment and debris must occur on a regular basis (unless otherwise specified within an approved plan), at suitable disposal sites or recycling sites and comply with applicable local, state and federal regulations.

(B) Corrective maintenance procedures are required to correct a problem or malfunction at a stormwater management facility and to restore the facility's intended operation and safe condition. Based upon the severity of the problem, corrective maintenance must be performed on an as-needed or emergency basis and

include such procedures as structural repairs, removal of debris, sediment and trash removal which threaten discharge capacity, erosion repair, snow and ice removal, fence repair, mosquito extermination, and restoration of vegetated and nonvegetated linings.

(C) In the event that the stormwater management facility becomes a danger to public safety or public health, or in need of maintenance, the City/Town of _____ shall so notify the responsible person in writing by certified mail. Upon receipt of that notice, the responsible person shall have fourteen (14) days to effect maintenance and repair of the facility in a manner that is approved by the municipality. If the responsible person fails or refuses to perform such maintenance and repair, the municipality may immediately proceed to do so and shall bill the cost thereof to the responsible person.

6.2 General Maintenance Standards for Stormwater Best Management Practices.

Maintenance design and maintenance procedures for all stormwater best management practices shall be in accordance *Rhode Island Stormwater Design and Installation Standards Manual*, as amended; or the *Rhode Island Soil Erosion and Sediment Control Handbook*, as amended. Stormwater management plans shall demonstrate appropriate maintenance design and procedures for each proposed best management practice. The following policies and standards for maintenance must be incorporated into stormwater management plans, as applicable.

(A) A maintenance schedule for each type of BMP must be included in the application package and on the final site plans. These schedules shall list the frequency and type of maintenance operations necessary along with the legally responsible party's name, address, and telephone number. If the stormwater drainage system is to be deeded to the local municipality the applicant must obtain a letter from the municipality acknowledging maintenance responsibility and intent of ownership.

(B) An area must be set aside within the development site for the purpose of sediment disposal (where applicable). The disposal area shall be large enough to handle the volume of two clean-out cycles. The site may also serve as open space and recreation areas.

(C) Proper erosion and sediment control practices must be implemented during all phases of construction and until the site is satisfactorily stabilized. These plans must be printed on the final

site plans submitted for approval. All control practices shall be in accordance with the most recent edition of the *Rhode Island Soil Erosion and Sediment Control Handbook*.

(D) Grasses selected for specific site conditions must be planted around and within basins immediately following construction to stabilize the slopes and prevent erosion. Trees and shrubs shall not be planted on any impounding embankments, to prevent potential subsurface disturbance and possible failure of the structure.

(E) Side-slopes, embankments, and the upper stage of basins shall be mowed at least once per growing season, to prevent unwanted woody growth. Mowing may be more frequent in residential areas if a more groomed appearance is desired, however if a stormwater facility is managed for wildlife habitat mowing shall be conducted after mid-August to prevent mortality to ground nesting birds and animals.

(F) All trash and litter and other debris shall be removed from any stormwater facility including inlet and outlet structures. Maintenance of this type improves the physical appearance of the facility and prevents blockage of inlet/outlet structures, thereby averting failure of the structure. This must be accomplished at least twice per year, preferably spring and fall.

(G) Sediments shall be removed from any basin immediately following site stabilization and thereafter in accordance with the specific maintenance plan. Accumulated sediments may have to be removed more frequently if the sediment storage capacity of the forebay or sediment storage area is within the last 10 percent of its available capacity. Sediment removal within a basin shall restore the original capacity and design depth.

(H) If blockage of a basin outlet structure occurs, it may be necessary to dewater the pond for access to the blockage. The dewatering flow must be adequately filtered prior to discharge into a receiving waterbody to remove suspended solids.

(I) Pools of stagnant water in detention basins indicate failure due to erosion and scouring of the basin bottom, particularly near an inlet device. Such a deficiency must be corrected immediately to prevent a nuisance habitat for insects, especially mosquitoes.

(J) All outlet structures and outflow channels must be inspected annually. Furthermore, extended detention devices should be

inspected at least twice per year. Inspections should be accomplished several times during the first six months of operation, especially after rainfall events to check for clogging or, conversely, too rapid of a release.

(K) The grassed areas of any basin must be inspected at least twice per year to check for erosion problems. Problem areas must be reseeded immediately to stabilize exposed soils, thereby preventing erosion and potential clogging of outflow devices.

(L) Inspections of all catch basins on-site shall occur on an annual basis to check for debris removal (sediment and hydrocarbons) and structural integrity or damage. Such deficiency must be corrected immediately.

(M) Repairs or replacement of inlet/outlet structures, riprap channels, fences, or other elements of the facility shall be done within 30 days of deficiency reports. If an emergency situation is imminent then repair/replacement must be done immediately to avert failure or danger to nearby residents.

Section 7—Site Plan

7.1 Map of Existing Site Conditions

The existing conditions site map is useful for reviewing the physical features present at the proposed development site prior to any alteration from land disturbance or construction. This map of predevelopment conditions should at minimum include the information listed below. Additionally, this map should have a scale no smaller than 1 inch = 100 feet with contour intervals no greater than 5 feet. Larger map scales providing greater detail will be acceptable. Individual sheets must not exceed 24 inches by 36 inches.

(A) North arrow with scale.

(B) Existing topography of the site.

(C) Subwatersheds must be clearly delineated and numbered for reference. Within each subwatershed the following information must be clearly noted: Area in acres, runoff curve number, soil types, hydrologic class, and hydrologic condition.

(D) The stormwater discharge location for each subwatershed must be identified and labeled with peak discharge rates and volumes for the required design storms.

(E) Location of steep slopes, bedrock outcrops, or other significant site constraints.

(F) The applicant's property lines and boundaries of proposed development with bearings and distances.

(G) Abutting property owners and their respective boundaries must be clearly shown along with nearby utility pole numbers and adjacent streets and intersections to facilitate identification of the proposed development.

(H) All perennial and intermittent streams, wetland boundaries, surface water bodies, and areas subject to storm flows or flooding must be indicated. In addition, all coastal features (as identified in the Coastal Resource Management Plan, CRMP), should be delineated where applicable.

(I) The 100-year flood plain boundary with 100-year flood elevations and floodway must be clearly identified consistent with the most recent Federal Emergency Management Agency maps. This may include identifying any applicable flood velocity zones.

(J) The location of existing on-site stormwater structures.

(K) The location and types of easements.

(L) The seasonal high groundwater table in the location of proposed stormwater structures (e.g., detention basins, infiltration trenches, vegetated swales, etc.) as established in accordance with the procedures described in Section 6 of the RI Stormwater Design and Installation Standards Manual.

(M) Location of any required investigative soil pits or test wells.

(N) The delineation of major soil types in the vicinity of the proposed development as identified by the RI Soil Survey or qualified professional.

(O) Location of private and public water supply wells within 100 feet.

(P) Location of existing ISDSs abutting to and within the development site.

(Q) Vegetative cover type including outline of woodland cover.

(R) Existing open space.

(S) Any landmarks, stonewalls, fences, etc.

7.2 Maps of Site Showing Phases of the Proposed Project

The final site map must have all information necessary to evaluate the proposed project after the final construction phase is completed. This map must be at the same scale as the existing conditions site plan map(s) and include the following information.

(A) North arrow with scale.

(B) Subwatersheds must be clearly delineated and numbered for reference. Within each subwatershed the following information must be clearly noted: Area in acres, runoff curve number, soil types, hydrologic class, and hydrologic condition.

(C) Location of proposed structures and individual lots. These lots must be numbered for reference.

(D) Delineation of Individual Sewage Disposal Systems, public and private water supply wells, utility lines, and sub-drains.

(E) Location of all existing and proposed roads, driveways, parking lots, and other impervious surfaces. The total area of all impervious surfaces within each subwatershed must be clearly marked and labeled within the subwatershed boundary.

(F) All new stormwater structures (BMPs), collection and conveyance systems, and remaining portions of existing systems including points of discharge shall be clearly identified.

(G) The peak discharge rate and volume of stormwater flow shall be labeled where stormwater enters and exits all BMPs. Additionally, the final discharge points labeled with peak discharge rates and volumes of stormwater flow must be shown for all subwatersheds.

(H) All water channels or areas subject to storm flows into wetlands, shoreline and coastal features, and tidal waters must be clearly identified whether on-site or in abutting off-site locations.

(I) Design details of all specified stormwater structures (e.g., basins,

trenches, etc.) including inlet and outlet structures.

(J) Limits of vegetation clearing and overall site disturbance including delineation of lawns, open space, etc.

(K) The final elevation grade of the proposed development.

(L) Easements are required for installation and access of all stormwater management devices. These must be clearly identified on final plans.

(M) Complete soil erosion and sediment control plans to be implemented in all construction phases along with final site stabilization plans.

(N) Maintenance schedules for all stormwater structures as specified in Section 12 of the RI Stormwater Design and Installation Standards Manual.

7.3 Site Plan Calculations

In addition to the information required for site plans the following information must also be included with the application, where applicable.

(A) The area of each subbasin as identified on final site plans.

(B) The area of impervious surfaces (including all roads, driveways, rooftops, sidewalks, etc.) for each subbasin as identified in 13.5(1) section of the RI Stormwater Design and Installation Standards Manual.

(C) Weighted curve numbers, (CN) as determined by the SCS TR-55 method, for the pervious surfaces within each subbasin as identified in 13.5(1) section of the RI Stormwater Design and Installation Standards Manual.

(D) Invert elevations for all applicable BMPs. In addition, the elevations for permanent and/or flood pool stages, including peak discharge rates for each stage, within all basins are required.

(E) The total volume capacity for all flood control and water quality BMPs (e.g. infiltration basin, detention basins, wet ponds, etc.). Volumes must be segregated into permanent and flood pool stage

volumes where applicable. Furthermore, the volumes of all sediment storage (basins, forebays, etc.) areas must also be shown.

(F) Predevelopment and postdevelopment peak discharge rates and runoff volumes for the 2-year, 25-year, and 100-year frequency storm events for each subwatershed. The water quality volume must also be calculated for each subwatershed. All relevant variables such as curve numbers and time of concentration, along with the supporting computations and worksheets must be included.

7.4 Narrative Description

As part of the Site Plan, a narrative description should be prepared by the applicant to provide the following information: a brief description of the proposed project; potential water quality and/or hydrologic impacts of the proposed project on surface and/or groundwater resources, existing infrastructure, and/or adjacent properties; and proposed measures or practices to mitigate potential impacts. All affected wetlands, surface water and groundwater resources, and any significant site constraints affecting the selection of stormwater management practices must be identified.

The following outline is provided as guidance for preparing a narrative description for the Site Plan. Depending on the size and scope of the proposed project, the amount of information required by the permitting agency may vary, therefore it is advised to consult the appropriate permitting agency for specific requirements.

(A) Site description – general topography, soil types, current vegetative composition and relative abundance, identification of major resources (e.g., wetlands, groundwater, surface waters, etc.) name of receiving water(s).

(B) Site input data – watershed characteristics, area of all impervious surfaces, total area of site, annual mean rainfall, runoff coefficients, curve numbers for various land uses, peak discharge rates.

(C) Pollutant loading forecast – predevelopment and postdevelopment pollutant mass loadings to demonstrate the removal rates of individual or combined BMPs.

(D) Land use planning and source control plan.

(E) Best Management Practices – identify the type of BMP and justification for selection, including any deviation from the RI Stormwater Design and Installation Standards Manual and the potential effect on pollutant removal efficiency.

(F) Technical feasibility – of BMPs including sizing, location, hydraulic and environmental impacts. Alternatives, which were considered but determined not to be feasible, should also be discussed.

Section 8—Maintenance Agreements

Maintenance agreements shall provide written, contractual documentation, which demonstrates compliance with this section and legal arrangements for the upkeep of stormwater facilities to assure their functionality and safety in accordance with this ordinance.

Maintenance agreements, which describe all maintenance schedules and requirements, must be developed for each stormwater management facility unless the facility is dedicated to and accepted by *[name of municipality]*.

8.1 Recognition of Municipal Inspection Requirements

Maintenance agreements shall include a reasonable and regular schedule for the *[name of municipality]*, or designee, to conduct on-site inspection of the functionality and safety of stormwater management facilities. Inspection schedules shall be based on the complexity and frequency of maintenance needs and shall be subject to the approval of *[name of municipality]*.

Maintenance agreements shall recognize the authority of *[name of municipality]*, or designee, to conduct on-site inspections of stormwater management facilities should evidence exist that the facility is not being operated in accordance with the maintenance agreement or this ordinance; or should evidence exist that the facility poses an eminent threat to public health, welfare or safety.

8.2 Record Keeping for Maintenance Activities

Maintenance agreements shall include provisions for maintenance record keeping. All activities conducted in accordance with a maintenance agreement

must be recorded in a work order and inspection log. Timely updates of the log shall be the responsibility of the stormwater management facility owner or other responsible party pursuant to Section 8.3 of this ordinance. Review of the maintenance and inspection log shall be completed by *[name of municipality]*, or designee, to determine the effectiveness of operation, maintenance and safety activities. Reviews shall occur as part of each on-site inspection. Additional reviews may be made as deemed appropriate by *[name of municipality]* or designee.

8.3 Responsibility for Maintenance to Assure Functionality and Safety

Appropriate maintenance to assure functionality and safety of stormwater management facilities shall be the responsibility the owner or may be assumed by another party via a written contractual arrangement in accordance with Section 8.4 of this ordinance.

8.4 Alterations to Maintenance Agreements

Any alterations in maintenance responsibility or alterations to maintenance agreements must be reviewed and approved by (name of municipal review board). If portions of the land serviced by a stormwater management facility are to be sold, written contractual arrangements shall be made to pass all responsibility of the maintenance agreement to the purchaser and shall be subject to review and approval of (name of municipal review board). All alterations to maintenance agreements shall be recorded in accordance with Section 8.5 of this ordinance.

8.5 Recordation of Maintenance Agreements

All maintenance agreements and alterations to maintenance agreements shall be recorded in the land evidence records of *[name of municipality]*. Copies of all maintenance agreements and alterations to maintenance agreements shall be included in stormwater management plans. Recordation of maintenance agreements in accordance with this ordinance shall be the responsibility of the owner.

Section 9— Policy and Requirements for Performance Surety

A performance bond shall be posted to insure that all stormwater management facilities can be repaired in the event of malfunction. To demonstrate the posting and integrity of the performance bond, a letter of

credit shall be provided as part of the stormwater management plan. The letter of credit and posting of the performance bond shall be the responsibility of the property owner.

9.1 Value of the Performance Surety

The value of the performance bond shall be at least equal to the cost of implementing the stormwater management plan, fully.

9.2 Review and Approval of the Performance Surety

The acceptance of the performance bond and letter of credit for the purposes of this ordinance shall be subject to approval of the form, content, amount and manner of execution by the (name of the municipal review board).

9.3 Posting of the Surety with the Subdivision Bond

The amount of a performance bond for the stormwater management plan may be included with the performance bond of a subdivision provided that the performance bond receives full review and approval by (name of municipal review board) in accordance with Section 9.2 of this ordinance. Such a posting shall still require a letter of credit.

9.4 Release of the Performance Surety

The performance bond shall only be released after an on-site inspection of all the stormwater management practices in operating condition as describe in the stormwater management plan, and submission of as-built drawings certified by a registered professional engineer as being in compliance with the stormwater management plan.

9.5 Revocation of the Performance Surety

[Name of municipality] may revoke the performance bond in accordance with Section 10 of this ordinance.

Section 10–-Application Fees

[Name of governing body] shall be empowered to collect fees from permit applicants, which are commensurate with the cost of administering this ordinance.

Section 11—Enforcement

[Name of municipality] shall have the authority and discretion to invoke penalties, whenever a stormwater management facility is not implemented and operated in accordance with its approval and this ordinance. Any penalty invoked shall be in accordance with this section.

11.1 Revocation or Suspension of Approval

The approval of stormwater management plans, stormwater management facility construction and stormwater management facility operation, as subject to this ordinance, may be revoked or suspended, and all work on the project halted for an indefinite time period by (name of municipal review board) or a designee, after written notification is transmitted by the building official to the developer for one or more of the following reasons:

(A) Failure to comply with any condition of an approved plan, or specifications pertaining thereof.

(B) Violation of any requirement of this ordinance.

11.2 Notification of Violation

Whenever there is a failure to comply with the provisions of this ordinance, the [*name of municipality*] shall have the right to notify the applicant/owner that he or she has (5) days from the receipt of the notice to temporarily correct the violations and (30) days from receipt of notice to permanently correct the violations.

Should the applicant/owner fail to take the corrective actions, the city/town of _____ shall then have the right to take whatever actions it deems necessary to correct the violations and to assert a lien on the subject property in an amount equal to the costs of remedial actions. The lien shall be enforced in the manner provided or authorized by law for the enforcement of common law liens on personal property. The lien shall be recorded in the land evidence records of the city/town of _____, and shall incur legal interest from the date of recording. The imposition of any penalty shall not exempt the offender from compliance with the provisions of this ordinance, including revocation of the performance bond or assessment of a lien on the property.

11.3 Hearing

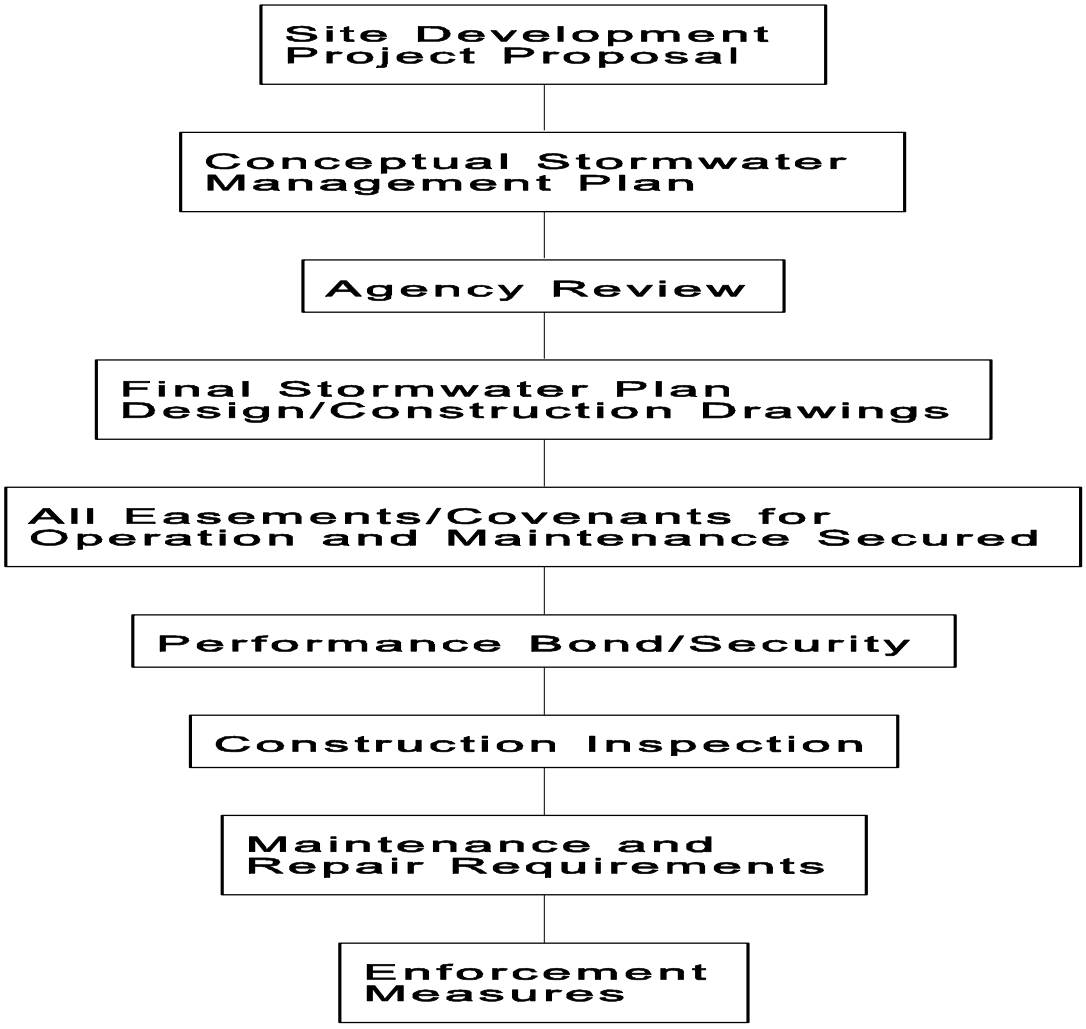
Any owner or responsible party, receiving a written notice of violation, shall be given an opportunity, within a reasonable time frame, for a hearing before the (name of municipal review board) to state their case. If evidence indicates that a violation has not occurred, the (name of municipal review board) shall revoke the notice of violation.

Section 12—Implementation

This ordinance shall take effect upon final passage and approval by the town/city council as appropriate.

APPENDIX F

MODEL POST-CONSTRUCTION STORM WATER RUNOFF CONTROL ORDINANCE


Site Development Project Proposal
Conceptual Stormwater Management Plan
Agency Review
Final Stormwater Plan Design/Construction Drawings
All Easements/Covenants for Operation and Maintenance Secured
Performance Bond/Security
Construction Inspection
Maintenance and Repair Requirements
Enforcement Measures

Model Ordinance for the Control of Post Construction Stormwater Runoff

Table of Contents

Section 1. General Provisions

1.1. Findings of Fact

It is hereby determined that:

Land development projects and associated increases in impervious cover alter the hydrologic response of local watersheds and increase stormwater runoff rates and volumes, flooding, stream channel erosion, and sediment transport and deposition;

This stormwater runoff contributes to increased quantities of water-borne pollutants, and;

Stormwater runoff, soil erosion and nonpoint source pollution can be controlled and minimized through the regulation of stormwater runoff from development sites.

Therefore, the **(jurisdictional stormwater authority)** establishes this set of water quality and quantity policies applicable to all surface waters to provide reasonable guidance for the regulation of stormwater runoff for the purpose of protecting local water resources from degradation. It is determined that the regulation of stormwater runoff discharges from land development projects and other construction activities in order to control and minimize increases in stormwater runoff rates and volumes, soil erosion, stream channel erosion, and nonpoint source pollution associated with stormwater runoff is in the public interest and will prevent threats to public health and safety.

1.2. Purpose

The purpose of this ordinance is to establish minimum stormwater management requirements and controls to protect and safeguard the general health, safety, and welfare of the public residing in watersheds within this jurisdiction. This ordinance seeks to meet that purpose through the following objectives:

(1). minimize increases in stormwater runoff from any development in order to reduce

flooding, siltation, increases in stream temperature, and streambank erosion and maintain the integrity of stream channels;

(2). minimize increases in nonpoint source pollution caused by stormwater runoff from development which would otherwise degrade local water quality

(3). minimize the total annual volume of surface water runoff which flows from any specific site during and following development to not exceed the pre-development hydrologic regime to the maximum extent practicable.

(4). reduce stormwater runoff rates and volumes, soil erosion and nonpoint source pollution, wherever possible, through stormwater management controls and to ensure that these management controls are properly maintained and pose no threat to public safety.

➲ *The above list is a general set of objectives to reduce the impact of stormwater on receiving waters. The local stormwater authority may wish to set some more specific objectives, based on priority water quality and habitat problems (e.g., to reduce phosphorus loads being delivered to recreational lakes, to sustain a class X trout fishery)*

1.3. Applicability

This ordinance shall be applicable to all subdivision or site plan applications, unless eligible for an exemption or granted a waiver by the **(jurisdictional stormwater authority)** under the specifications of Section 4 of this ordinance. The ordinance also applies to land development activities that are smaller than the minimum applicability criteria if such activities are part of a larger common plan of development that meets the following applicability criteria, even though multiple separate and distinct land development activities may take place at different times on different schedules. In addition, all plans must also be reviewed by local environmental protection officials to ensure that established water quality standards will be maintained during and after development of the site and that post construction runoff levels are consistent with any local and regional watershed plans.

➲ *The size of the site development to which post-construction stormwater management runoff control applies varies but many communities opt for a size limit of 5000 square feet or more. For sites less than 5000 square feet, local officials may wish to grant an exemption as long as the amount of impervious cover created does not exceed 1000 square feet.*

To prevent the adverse impacts of stormwater runoff, the **(jurisdictional stormwater authority)** has developed a set of performance standards that must be met at new development sites. These standards apply to any construction activity disturbing ____ or more square feet of land. The following activities may be exempt from these stormwater performance criteria:

1. Any logging and agricultural activity which is consistent with an approved soil conservation plan or a timber management plan prepared or approved by the **(appropriate agency)**, as applicable.
2. Additions or modifications to existing single family structures
3. Developments that do not disturb more than ____ square feet of land, provided they are not part of a larger common development plan;
4. Repairs to any stormwater treatment practice deemed necessary by

(jurisdictional stormwater authority).

When a site development plan is submitted that qualifies as a redevelopment project as defined in Section 2 of this ordinance, decisions on permitting and on-site stormwater requirements shall be governed by special stormwater sizing criteria found in the current stormwater design manual. This criteria is dependent on the amount of impervious area created by the redevelopment and its impact on water quality. Final authorization of all redevelopment projects will be determined after a review by **(jurisdictional stormwater authority)**.

➲ *There are a number of decisions to be made by local communities when addressing the issue of redevelopment and stormwater treatment. The first is defining exactly what qualifies as redevelopment. The definition in Section 2 is from the current Maryland Stormwater Management regulations, and uses the square foot size of the project and its land use classification to establish the definition of a redevelopment project. The second decision involves to what level of stormwater management standards redevelopment projects will be held. Providing cost effective stormwater treatment at redevelopment sites is often a difficult task, and these projects may be given reduced criteria to meet to allow for site constraints. The State of Maryland currently requires that proposed redevelopment project designs include either at least a 20 percent reduction in existing site impervious area, management of at least 20 % of the water quality volume, or some combination of both.*

1.4. Compatibility with Other Permit and Ordinance Requirements

This ordinance is not intended to interfere with, abrogate, or annul any other ordinance, rule or regulation, stature, or other provision of law. The requirements of this ordinance should be considered minimum requirements, and where any provision of this ordinance imposes restrictions different from those imposed by any other ordinance, rule or regulation, or other provision of law, whichever provisions are more restrictive or impose higher protective standards for human health or the environment shall be considered to take precedence.

1.5. Severability

If the provisions of any article, section, subsection, paragraph, subdivision or clause of this ordinance shall be judged invalid by a court of competent jurisdiction, such order of judgment shall not affect or invalidate the remainder of any article, section, subsection, paragraph, subdivision or clause of this ordinance.

1.6. Development of a Stormwater Design Manual

The **(jurisdictional stormwater authority)** may furnish additional policy, criteria and information including specifications and standards, for the proper implementation of the requirements of this ordinance and may provide such information in the form of a Stormwater Design Manual.

This manual will include a list of acceptable stormwater treatment practices, including the specific design criteria and operation and maintenance requirements for each stormwater practice. The manual may be updated and expanded from time to time, at the discretion of the local review authority, based on improvements in engineering, science, monitoring and local maintenance experience. Stormwater treatment practices that are designed and constructed in

accordance with these design and sizing criteria will be presumed to meet the minimum water quality performance standards.

➲ *Local communities will need to select the minimum water quality performance standards (e.g., 80% TSS, 40% P) they will require for stormwater treatment practices and place these in their design manual. The 80% removal goal for total suspended solids (TSS) is a management measure developed by EPA as part of the Coastal Zone Act Reauthorization Amendments of 1990. It was selected by EPA for the following factors: (1) removal of 80% is assumed to control heavy metals, phosphorus, and other pollutants; (2) a number of states including DE, FL, TX, MD, and MA require/recommend TSS removal of 80% or greater for new development; and (3) data show that certain structural controls, when properly designed and maintained, can meet this performance level. Further discussion of water quality standards for stormwater management measures can be found in the CZARA Coastal Zone 6217(g) management measures document entitled "Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters" (US EPA, 1993).*

➲ *There are a number of good stormwater design manuals available around the country that communities may wish to refer to in creating their own local manual. Two examples are the new Maryland Department of the Environment 2000 Maryland Stormwater Design Manual Volumes I & II available online at http://www.mde.state.md.us/environment/wma/stormwatermanual/ and the Stormwater Management Manual for Western Washington, Volumes 1-5 available online at http://www.ecy.wa.gov/programs/wq/stormwater/manual.html.*

➲ *Local communities may also wish to consult a new resource available on the Internet called the **Stormwater Managers Resource Center (SMRC)**. This site is dedicated to providing information to stormwater management program managers in Phase II communities to assist in meeting the requirements of the new National Pollutant Discharge Elimination System Phase II regulations. Among the resources available at the website will be a section devoted to supplying guidance on how to build a stormwater manual, including sizing and design criteria. The SMRC website and the manual-builder resources are located at www.stormwatercenter.net.*

Section 2. Definitions

"Accelerated Erosion" means erosion caused by development activities that exceeds the natural processes by which the surface of the land is worn away by the action of water, wind, or chemical action.

"Applicant" means a property owner or agent of a property owner who has filed an application for a stormwater management permit.

"Building" means any structure, either temporary or permanent, having walls and a roof, designed for the shelter of any person, animal, or property, and occupying more than 100 square feet of area.

"Channel" means a natural or artificial watercourse with a definite bed and banks that conducts continuously or periodically flowing water.

"Dedication" means the deliberate appropriation of property by its owner for general public use.

"**Detention**" means the temporary storage of storm runoff in a stormwater management practice with the goals of controlling peak discharge rates and providing gravity settling of pollutants.

"Detention Facility" means a detention basin or alternative structure designed for the purpose of temporary storage of stream flow or surface runoff and gradual release of stored water at controlled rates.

"Developer" means a person who undertakes land disturbance activities.

"Drainage Easement" means a legal right granted by a landowner to a grantee allowing the use of private land for stormwater management purposes.

"Erosion and Sediment Control Plan" means a plan that is designed to minimize the accelerated erosion and sediment runoff at a site during construction activities.

"Fee in Lieu" means a payment of money in place of meeting all or part of the storm water performance standards required by this ordinance.

"**Hotspot**" means an area where land use or activities generate highly contaminated runoff, with concentrations of pollutants in excess of those typically found in stormwater.

"**Hydrologic Soil Group (HSG)**" means a Natural Resource Conservation Service classification system in which soils are categorized into four runoff potential groups. The groups range from A soils, with high permeability and little runoff production, to D soils, which have low permeability rates and produce much more runoff.

"**Impervious Cover**" means those surfaces that cannot effectively infiltrate rainfall (e.g., building rooftops, pavement, sidewalks, driveways, etc).

"**Industrial Stormwater Permit**" means an National Pollutant Discharge Elimination System permit issued to a commercial industry or group of industries which regulates the pollutant levels associated with industrial stormwater discharges or specifies on-site pollution control strategies.

"**Infiltration**" means the process of percolating stormwater into the subsoil.

"**Infiltration Facility**" means any structure or device designed to infiltrate retained water to the subsurface. These facilities may be above grade or below grade.

"**Jurisdictional Wetland**" means an area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation.

"Land Disturbance Activity" means any activity which changes the volume or peak flow discharge rate of rainfall runoff from the land surface. This may include the grading, digging, cutting, scraping, or excavating of soil, placement of fill materials, paving, construction, substantial removal of vegetation,, or any activity which bares soil or rock or involves the diversion or piping of any natural or man-made watercourse.

"Landowner" means the legal or beneficial owner of land, including those holding the right to purchase or lease the land, or any other person holding proprietary rights in the land.

"**Maintenance Agreement**" means a legally recorded document that acts as a property deed restriction, and which provides for long-term maintenance of storm water management practices.

"**Nonpoint Source Pollution"** means pollution from any source other than from any discernible, confined, and discrete conveyances, and shall include, but not be limited to, pollutants from agricultural, silvicultural, mining, construction, subsurface disposal and urban runoff sources.

"Offset Fee" means a monetary compensation paid to a local government for failure to meet pollutant load reduction targets.

"Off-Site Facility" means a stormwater management measure located outside the subject property boundary described in the permit application for land development activity.

"On-Site Facility" means a stormwater management measure located within the subject property boundary described in the permit application for land development activity.

"Recharge" means the replenishment of underground water reserves.

"**Redevelopment**" means any construction, alteration or improvement exceeding ___ square feet in areas where existing land use is high density commercial, industrial, institutional or multi-family residential.

"Stop Work Order" means an order issued which requires that all construction activity on a site be stopped.

"Storm Water Management" means the use of structural or non-structural practices that are designed to reduce storm water runoff pollutant loads, discharge volumes, peak flow discharge rates and detrimental changes in stream temperature that affect water quality and habitat.

"Storm Water Retrofit" means a stormwater management practice designed for an existing development site that previously had either no stormwater management practice in place or a practice inadequate to meet the stormwater management requirements of the site.

"**Stormwater Runoff**" means flow on the surface of the ground, resulting from precipitation.

"**Stormwater Treatment Practices (STPs)**" means measures, either structural or nonstructural, that are determined to be the most effective, practical means of preventing or reducing point source or nonpoint source pollution inputs to stormwater runoff and water bodies.

"**Water Quality Volume (WQ_v)**" means the storage needed to capture and treat 90% of the average annual stormwater runoff volume. Numerically **(WQ_v)** will vary as a function of long term rainfall statistical data.

"Watercourse" means a permanent or intermittent stream or other body of water, either natural or man-made, which gathers or carries surface water.

Section 3. Permit Procedures and Requirements

3.1. Permit Required.

No land owner or land operator shall receive any of the building, grading or other land development permits required for land disturbance activities without first meeting the requirements of this ordinance prior to commencing the proposed activity.

➲ *The intent is to ensure that no activities that disturb the land are issued permits prior to review and approval of the stormwater management plan. Communities may elect to issue a stormwater management permit separate of any other land development permits required, or, as in this ordinance, tie the issuing of construction permits to the approval of a final stormwater management plan.*

3.2. Application Requirements

Unless specifically excluded by this ordinance, any land owner or operator desiring a permit for a land disturbance activity shall submit to the **(jurisdictional stormwater authority)** a permit application on a form provided for that purpose.

Unless otherwise excepted by this ordinance, a permit application must be accompanied by the following in order that the permit application be considered: a stormwater management concept plan; a maintenance agreement; and a non-refundable permit review fee.

The stormwater management plan shall be prepared to meet the requirements of Sec. 5 of this ordinance, the maintenance agreement shall be prepared to meet the requirements of Sec. 9 of this ordinance, and fees shall be those established by the **(jurisdictional stormwater authority)**.

3.3. Application Review Fees

The fee for review of any land development application shall be based on the amount of land to be disturbed at the site, and the fee structure shall be established by the **(jurisdictional stormwater authority)**. All of the monetary contributions shall be credited to a local budgetary category to support local plan review, inspection and program administration, and shall be made prior to the issuance of any building permit for the development.

➲ *Local communities can use these review fees to raise funds for staff and resources to further their stormwater management programs.*

3.4. Application Procedure

1. Applications for land disturbance activity permits must be filed with the **(appropriate review agency)** on any regular business day.
2. A copy of this permit application shall be forwarded to **(jurisdictional stormwater authority)** for review
3. Permit applications shall include the following: two copies of the stormwater management concept plan, two copies of the maintenance agreement, and any required review fees.
4. Within __ business days of the receipt of a complete permit application, including all documents as required by this ordinance, the **(jurisdictional stormwater authority)** shall inform the applicant whether the application, plan and maintenance agreement are approved or disapproved.

➲ *Local officials will need to decide the appropriate time frame for review of an application. This will often be determined by the staff available for permit review and for an inspection of sites undergoing construction.*

5. If the permit application, stormwater management plan or maintenance agreement are disapproved, the applicant may revise the stormwater management plan or agreement. If additional information is submitted, the **(jurisdictional stormwater authority)** shall have __ business days from the date the additional information is received to inform the applicant that the plan and maintenance agreement are either approved or disapproved.

6. If the permit application, final stormwater management plan and maintenance agreement are approved by the **(jurisdictional stormwater authority)**, all appropriate land disturbance activity permits shall be issued.

3.5. Permit Duration

Permits issued under this section shall be valid from the date of issuance through the date the **(jurisdictional stormwater authority)** notifies the permitholder that all stormwater management practices have passed the final inspection required under permit condition.

Section 4. Waivers to Stormwater Management Requirements

4.1. Waivers for Providing Stormwater Management

Every applicant shall provide for stormwater management as required by this ordinance, unless a written request is filed to waive this requirement. Requests to waive the stormwater management plan requirements shall be submitted to the **(jurisdictional stormwater authority)** for approval.

The minimum requirements for stormwater management may be waived in whole or in part upon written request of the applicant, provided that at least one of the following conditions applies:

1. It can be demonstrated that the proposed development is not likely to impair attainment of the objectives of this ordinance.
2. Alternative minimum requirements for on-site management of stormwater discharges have been established in a stormwater management plan that has been approved by the **(jurisdictional stormwater authority)** and the implementation of the plan is required by local ordinance.
3. Provisions are made to manage stormwater by an off-site facility. The off-site facility is required to be in place, to be designed and adequately sized to provide a level of stormwater control that is equal to or greater than that which would be afforded by on-site practices and there is a legally obligated entity responsible for long-term operation and maintenance of the stormwater practice.
4. The **(jurisdictional stormwater authority)** finds that meeting the minimum on-site management requirements is not feasible due to the natural or existing physical characteristics of a site.
5. Non-structural practices will be used on the site that reduce: a) the generation of stormwater from the site, b) the size and cost of stormwater storage and c) the pollutants generated at the site. These non-structural practices are explained in detail in the current design manual and the amount of credit available for using such practices shall be determined by the **(jurisdictional stormwater authority)**.

In instances where one of the conditions above applies, the **(jurisdictional stormwater authority)** may grant a waiver from strict compliance with these stormwater management provisions, as long as acceptable mitigation measures are provided. However, to be eligible for a

variance, the applicant must demonstrate to the satisfaction of the **(jurisdictional stormwater authority)** that the variance will not result in the following impacts to downstream waterways:

Deterioration of existing culverts, bridges, dams, and other structures;
Degradation of biological functions or habitat;
Accelerated streambank or streambed erosion or siltation;
Increased threat of flood damage to public health, life, property .

Furthermore, where compliance with minimum requirements for stormwater management is waived, the applicant will satisfy the minimum requirements by meeting one of the mitigation measures selected by the jurisdictional stormwater authority. Mitigation measures may include, but are not limited to, the following:

- The purchase and donation of privately owned lands, or the grant of an easement to be dedicated for preservation and/or reforestation. These lands should be located adjacent to the stream corridor in order to provide permanent buffer areas to protect water quality and aquatic habitat,
- The creation of a stormwater management facility or other drainage improvements on previously developed properties, public or private, that currently lack stormwater management facilities designed and constructed in accordance with the purposes and standards of this ordinance,
- Monetary contributions (Fee-in-Lieu) to fund stormwater management activities such as research and studies (e.g., regional wetland delineation studies, stream monitoring studies for water quality and macroinvertebrates, stream flow monitoring, threatened and endangered species studies, hydrologic studies, and monitoring of stormwater management practices.

4.2. Fee in Lieu of Stormwater Management Practices.

Where the **(jurisdictional stormwater authority)** waives all or part of the minimum stormwater management requirements, or where the waiver is based on the provision of adequate stormwater facilities provided downstream of the proposed development, the applicant shall be required to pay a fee in an amount as determined by the **(jurisdictional stormwater authority)**.

When an applicant obtains a waiver of the required stormwater management, the monetary contribution required shall be in accordance with a fee schedule (unless the developer and the stormwater authority agree on a greater alternate contribution) established by the **(jurisdictional stormwater authority)**, and based on the cubic feet of storage required for stormwater management of the development in question. All of the monetary contributions shall be credited to an appropriate capital improvements program project, and shall be made by the developer prior to the issuance of any building permit for the development.

4.3. Dedication of land

In lieu of a monetary contribution, an applicant may obtain a waiver of the required stormwater management by entering into an agreement with the **(jurisdictional stormwater authority)** for the granting of an easement or the dedication of land by the applicant, to be used for the

construction of an off-site stormwater management facility. The agreement shall be entered into by the applicant and the **(jurisdictional stormwater authority)** prior to the recording of plats or, if no record plat is required, prior to the issuance of the building permit.

Section 5. General Performance Criteria for Stormwater Management

Unless judged by the **(jurisdictional stormwater authority)** to be exempt or granted a waiver, the following performance criteria shall be addressed for stormwater management at all sites:

(A). All site designs shall establish stormwater management practices to control the peak flow rates of stormwater discharge associated with specified design storms and reduce the generation of stormwater. These practices should seek to utilize pervious areas for stormwater treatment and to infiltrate stormwater runoff from driveways, sidewalks, rooftops, parking lots, and landscaped areas to the maximum extent practical to provide treatment for both water quality and quantity.

➲ *There are several sources of climatological references that can be consulted to find the rainfall depths for the appropriate design storm intervals (1, 10, 25, and 100 year). The NOAA National Climatological Data Center has a "Summary of the Day" database that can provide rainfall numbers for most major cities and airports in the country. Another possible source is the Urban Hydrology for Small Watersheds, TR-55 (Technical Release 55) published by the Engineering Division, United States Natural Resource Conservation Service (formerly known as the Soil Conservation Service) United States Department of Agriculture, June 1986.*

(B). All stormwater runoff generated from new development shall not discharge untreated stormwater directly into a jurisdictional wetland or local water body without adequate treatment. Where such discharges are proposed, the impact of the proposal on wetland functional values shall be assessed using a method acceptable to the **(jurisdictional stormwater authority)**. In no case shall the impact on functional values be any less than allowed by the Army Corp of Engineers (ACE) or the **(Appropriate State Agency)** responsible for natural resources.

(C). Annual groundwater recharge rates shall be maintained, by promoting infiltration through the use of structural and non-structural methods. At a minimum, annual recharge from the post development site shall mimic the annual recharge from pre-development site conditions.

➲ *Recharge is a relatively new stormwater criteria, and has been implemented so far in the Massachusetts coastal zone and in Maryland. The recharge criteria requires considerable effort to use existing pervious areas for stormwater treatment and infiltration, which means that it must be considered very early in the site design process when basic decisions about layout and vegetative cover are made. For additional discussion of recharge criteria, consult the manual builder on the Stormwater Managers Resource Center (SMRC) at www.stormwatercenter.net.*

(D). For new development, structural stormwater treatment practices shall be designed to remove __% of the average annual post development total suspended solids load (TSS). It is presumed that a STP complies with this performance standard if it is:

- sized to capture the prescribed water quality volume (WQ_v).
- designed according to the specific performance criteria outlined in the local stormwater design manual,
- constructed properly, and
- maintained regularly.

➲ *For post construction stormwater runoff, the ability of stormwater management programs to meet federal guidelines under the NPDES regulations will become increasingly important. A local government seeking to manage runoff to achieve water quality standards has a number of options for reaching their goal. The options are listed below, from the most typical standard stormwater quality practice to more advanced program options. Each option has an associated level of effort for the management of stormwater, and the likelihood of realizing water quality treatment goals depends on the option a local government selects. Local governments should assess the option they wish to select in light of new Phase II regulations and the current ability of their stormwater management staff to meet more extensive local/state staff review and inspection requirements.*

Option 1. Require Stormwater Treatment Practices for Stormwater Quality

Many current stormwater programs simply require that the developer install stormwater treatment practices, but do not specify a target for specific pollutant reduction performance. These programs simply require that a standard volume of stormwater be treated (e.g., a half-inch of runoff). Many of these programs also have generous waiver and exemption provisions, so that as much as 25% of all new development can avoid criteria for water quality. Unless the target removal goals are very low, these communities cannot expect their current programs to eliminate net additional pollutants associated with future development.

(See City of Knoxville, TN Stormwater and Street Ordinance, at http://www.ci.knoxville.tn.us/)

Option 2. Institute More Rigorous Design Standards for Stormwater Practices.

A number of communities have improved their stormwater programs by strengthening their design standards for stormwater practices. This has involved narrowing the list of acceptable practices to those with a proven ability to remove particular pollutants, increasing the volume of runoff that is treated by each practice (e.g, treat first 1" of stormwater runoff), clamping down on waivers and exemptions (or requiring a fee-in-lieu), and requiring design features that reduce maintenance problems.

The advantage of this program option is that compliance can be presumed as long as designers follow the design rules. It does require a good stormwater manual and more extensive local/state staff review and training. It can achieve significant reduction for some pollutants, such as sediment and nutrients. The disadvantage of the program option is that current stormwater technology may not be effective enough for some pollutants (e.g., bacteria), or capable of reducing the net additional load for high levels from future development.

(For an example see Maryland Department of the Environment 2000 Maryland Stormwater Design Manual available at http://www.mde.state.md.us/environment/wma/stormwatermanual/ . The states of New York and Vermont are in the process of adopting similar design standards for their manuals).

Option 3. Require On-Site Load Calculation

A handful of communities have adopted an approach whereby the design engineer must calculate pre- and post- development loads for a particular pollutant, and then design a system of practices to meet a load reduction target, based on STP removal rates. Phosphorus has been used in most cases, and the load

reduction target varies. This option results in more directed design geared more specifically to the pollutant of concern.

The on-site load calculation option has several disadvantages. First, designers can select to use math modeling to their advantage to reduce costs and come into compliance. Second, technical data to support the program option are limited to just a few parameters, such as phosphorus, nitrogen and sediment. Third, the removal rates for the stormwater practices seldom account for factors where pollutant load removal is compromised, and tend to be optimistic. Lastly, this program option is very intensive in terms of local review and compliance, and requires more staffing to implement.

(For an example of on-site load calculation see the publication Phosphorus Control in Lake Watersheds: A Technical Guide to Evaluating New Development by the Maine Department of Environmental Protection. Another example where this option has been applied is for New York City water supply areas).

Option 4. Load Calculation w/ Stormwater Offset Fee to Provide Retrofits on Existing Development

In this program option, a community requires the on-site load calculation described in Option 3, but is very conservative in the assumptions it allows on loading and removal efficiency. Consequently, designers at most sites cannot fully comply with the load reduction for the requirement at their site. To fully comply, they must pay an offset fee to the local government which is used to support design and construction of stormwater retrofits at existing development in the watershed. The fee is set at the cost of providing an equivalent amount of pollutant removal elsewhere (dollars/pound).

The advantage of this approach is that it provides a means of financing the stormwater retrofits needed to reduce pollutant loads from existing development. It does require greater local staffing to find, design and build the retrofits which offset the loads from new development. If administered properly, this program option can potentially eliminate the net additional load from new development. Several communities currently provide this option for developers, but it is not clear how much revenue has been collected so far.

(This option has been applied in Maryland Critical Areas and Virginia Chesapeake Bay resource management areas. For more information, see the website regarding the Maryland Critical Area Act at http://www.dnr.state.md.us/criticalarea/ and the Virginia Chesapeake Bay Preservation Area Regulation at http://www.cblad.state.va.us/regs.htm)

(E). To protect stream channels from degradation, a specific channel protection criteria shall be provided as prescribed in the current stormwater manual.

➲ *Channel protection is a relatively new criteria, but is increasingly viewed as a critical one due to the mounting evidence that stream channels enlarge in response to watershed development. Studies have found higher bank erosion rates and increased instream sediment loads for urban streams when compared to the 5-20% estimate for the annual sediment budget attributable to bank erosion in rural streams (Walling and Woodward, 1995; Collins et al., 1997). Research also indicates that channel enlargement can begin at a relatively low level of watershed development, as indicated by the amount of impervious cover. One study estimated that channel erosion rates were three to six times higher in a moderately urbanized watershed (14% impervious cover) than in a comparable rural one, with less than 2% impervious cover (Neller, 1988).*

The basic methodology to calculate channel enlargement relies on obtaining historical cross-sectional data from past surveys (often obtained from transportation agencies or public works departments that conducted surveys at the time of road construction or improvement projects) and comparing these with current cross-sectional data obtained from field surveys conducted at the time of the study. The approach also utilizes predictive (i.e., empirical) equations to estimate an ultimate channel enlargement ratio once the channel has enlarged sufficiently to be in balance with its hydrological forces.

Basic Options for Stream Channel Protection

Many different design criteria have been suggested to protect downstream channels from erosion. It should be clearly noted that none of these criteria have yet been monitored in the field to demonstrate their effectiveness, and most are based on hydrologic or hydraulic modeling of streams. The three options that appear to hold some promise are:

***24 hour detention of the one year storm event**. This criteria would result in up to 24 hours of detention for runoff generated by a rainfall depth based on annual rainfall for a region. Smaller storms events would also experience some detention, but probably much less than 24 hours. The premise of this criteria is that runoff would be stored and released in such a gradual manner that critical erosive velocities would seldom be exceeded in downstream channels. The required volume needed for 1 year extended detention is significant; it is roughly equivalent to about 90 to 95% of the required volume needed for ten year peak discharge control. Consequently, the need for two year peak discharge management would be eliminated when the 1 year ED is provided, as long as the ten year peak discharge control is achieved. (For an example, see Maryland Department of the Environment 2000 Maryland Stormwater Design Manual available at http://www.mde.state.md.us/environment/wma/stormwatermanual/ . The states of New York and Virginia also use this design criteria for stream channel protection in their stormwater design manuals*).

***Distributed runoff control (DRC):** This criteria has been developed by MaCrae (1993) and involves complex field assessments and modeling to determine the hydraulic stress and erosion potential of bank materials. The criteria states that channel erosion is minimized if the alteration in the transverse distribution of erosion potential about a channel parameter is maintained constant with predevelopment values, over the range of available flows, such that the channel is just able to move the dominant particle size of the bed load. This Canadian method holds promise, but has not been tested extensively in the United States and requires significantly greater data collection and modeling then any of the other methods.*
(For a discussion of this criteria, see the Vermont Stormwater Management Handbook Technical Support Document- Appendix B, November 2000).

***Bankfull capacity/duration criteria:** This criteria has been advanced by Tapley et al 1996, and states that the post-development, bankfull flow frequency, duration and depth must be controlled to predevelopment values at a designated control point(s) in the channel. The Rule of thumb for selecting control point(s) is to use a 10: 1 ratio of peak discharge from the one year storm for the developed site to the discharge from the stream for the same frequency storm (Tapley et al, 1996). In theory, this criteria should result in a high level of downstream protection. The practical problem is in defining how the criteria is to be interpreted; whether sub-bankfull events (that typically erode the toe of the streambank) should also be considered; and precisely where the "bankfull" should be measured. For example, the channel of many streams have been modified in the past by prior land uses and channelization, and may not represent the "true" channel. In other cases, the stormwater outfall discharge laterally to a stream, and it is therefore difficult to assign which flows the developer is actually responsible for controlling.*

Pros and Cons of Channel Protection Sizing Criteria.

Each of the three options has some limitations. For example, both the DRC and bankfull capacity sizing criteria options lack widely accepted or universal design methodologies. In each case, local stream cross-section and/or soil measurements are needed, and considerable contention between the designer and the reviewer can be expected on how and where the analysis should be performed. Given the many operational problems currently associated with either option, and the lack of a tested design methodology at present, the two options probably deserve further study, but are not ready for wide application.

This leaves only one remaining option-- the one-year 24 hour detention criteria. It, too, has some limitations:

- *results in unacceptably small diameter orifices for sites less than ten acres in size.*
- *requires a storage volume roughly equivalent to that needed for two year control.*
- *has not been "tested" by continuous simulation modeling to determine if acceptable detention times can be achieved for smaller storms can be achieved (1.0 to 1.5 inches).*
- *is only needed in streams that are susceptible to bank erosion.*

Based on the foregoing, it appears that the best option to provide channel protection (Cp_v) is 12 to 24 hour extended detention of the one-year 24 hour storm event. This Cp_v requirement only applies to sites greater than ten acres in size. Local governments may wish to retain the option of employing the DRC or bankfull capacity/duration criteria as an alternative, should their analytical and design requirements become more simplified and refined in the future

There are some basic exemptions to where the channel protection criteria should be applied (small drainage areas, direct discharge to tidal waters or a lake, flat terrain etc), and communities must decide how and when this criteria will be required.

(F). Stormwater discharges to critical areas with sensitive resources (i.e., cold water fisheries, shellfish beds, swimming beaches, recharge areas, water supply reservoirs) may be subject to additional performance criteria, or may need to utilize or restrict certain stormwater management practices.

(G). Certain industrial sites are required to prepare and implement a stormwater pollution prevention plan, and shall file a notice of intent (NOI) under the provisions of the National Pollutant Discharge Elimination System (NPDES) general permit. The stormwater pollution prevention plan requirement applies to both existing and new industrial sites.

➲ *Applicants and local communities may wish to consult the Environmental Protection Agency website at http://www.epa.gov/owm/swm/phase2 for more information on Phase II requirements.*

(H). Stormwater discharges from land uses or activities with higher potential pollutant loadings, known as “hotspots”, may require the use of specific structural STPs and pollution prevention practices.

(I). Prior to design, applicants are required to consult with the **(jurisdictional stormwater authority)** to determine if they are subject to additional stormwater design requirements.

(J). The calculations for determining peak flows as found in the Stormwater Design Manual shall be used for sizing all stormwater management practices.

Section 6. Basic Stormwater Management Design Criteria

➲ *Rather than place specific stormwater design criteria into an ordinance, it is often preferable to fully detail these requirements in a stormwater design manual. This allows specific design information to change over time as new information or techniques become available without requiring the formal process needed to change ordinance language. The ordinance can then require those submitting any development application to consult the current stormwater design manual for the exact design criteria for the stormwater management practices appropriate for their site.*

In the Maryland Stormwater Design Manual, for example, there are a set of specified performance criteria for each stormwater management practice, based on six factors:

- *Site Design Feasibility -*
- *Conveyance Issues -*
- *Pretreatment Requirements -*
- *Treatment/Geometry Conditions*
- *Environmental/Landscaping Standards*
- *Maintenance Needs*

Each community will need to decide the specific design and sizing criteria for the stormwater management practices they allow, and select a storm event frequency(1, 2, 10, 100 year) that they believe will meet their stormwater quality and quantity control requirements.

6.1. Minimum Control Requirements

All stormwater management practices will be designed so that the specific storm frequency storage volumes (e.g., recharge, water quality, channel protection, 10 year, 100 year) as identified in the current stormwater design manual are met, unless the **(jurisdictional stormwater authority)** grants the applicant a waiver or the applicant is exempt from such requirements.

In addition, if hydrologic or topographic conditions warrant greater control than that provided by the minimum control requirements, the **(jurisdictional stormwater authority)** reserves the right to impose any and all additional requirements deemed necessary to control the volume, timing, and rate of runoff.

6.2 Site Design Feasibility

Stormwater management practices for a site shall be chosen based on the physical conditions of the site. Among the factors that should be considered:

1. Topography
2. Maximum Drainage Area
3. Depth to Water Table
4. Soils
5. Slopes
6. Terrain
7. Head

8. Location in relation to environmentally sensitive features or ultra-urban areas

Applicants shall consult the Stormwater Design Manual for guidance on the factors that determine site design feasibility when selecting a stormwater management practice.

6.3. Conveyance Issues

All stormwater management practices shall be designed to convey stormwater to allow for the maximum removal of pollutants and reduction in flow velocities. This shall include, but not be limited to:

1. Maximizing of flowpaths from inflow points to outflow points
2. Protection of inlet and outfall structures
3. Elimination of erosive flow velocities
4. Providing of underdrain systems, where applicable

The Stormwater Design Manual shall provide detailed guidance on the requirements for conveyance for each of the approved stormwater management practices.

6.4. Pretreatment Requirements

Every stormwater treatment practice shall have an acceptable form of water quality pretreatment, in accordance with the pretreatment requirements found in the current stormwater design manual. Certain stormwater treatment practices, as specified in the Stormwater Design Manual, are prohibited even with pretreatment in the following circumstances:

A. Stormwater is generated from highly contaminated source areas known as "hotspots"

B. Stormwater is carried in a conveyance system that also carries contaminated, non-stormwater discharges

C. Stormwater is being managed in a designated groundwater recharge area.

D. Certain geologic conditions exist (e.g., karst) that prohibit the proper pretreatment of stormwater.

6.5. Treatment/Geometry Conditions

All stormwater management practices shall be designed to capture and treat stormwater runoff according to the specifications outlined in the Stormwater Design Manual. These specifications will designate the water quantity and quality treatment criteria that apply to an approved stormwater management practice.

6.6. Landscaping Plans Required

All stormwater management practices must have a landscaping plan detailing both the vegetation to be in the practice and how and who will manage and maintain this vegetation. This plan must be prepared by a registered landscape architect or soil conservation district.

6.7. Maintenance Agreements

All stormwater treatment practices shall have an enforceable operation and maintenance agreement to ensure the system functions as designed. This agreement will include any and all maintenance easements required to access and inspect the stormwater treatment practices, and to

perform routine maintenance as necessary to ensure proper functioning of the stormwater treatment practice. In addition, a legally binding covenant specifying the parties responsible for the proper maintenance of all stormwater treatment practices shall be secured prior to issuance of any permits for land disturbance activities.

6.8. Non-Structural Stormwater Practices

The use of non-structural stormwater treatment practices is encouraged in order to minimize the reliance on structural practices. Credit in the form of reductions in the amount of stormwater that must be managed can be earned through the use of non-structural practices that reduce the generation of stormwater from the site. These non-structural practices are explained in detail in the current design manual and applicants wishing to obtain credit for use of non-structural practices must ensure that these practices are documented and remain unaltered by subsequent property owners.

Section 7. Requirements for Stormwater Management Plan Approval

7.1. Stormwater Management Plan Required for All Developments.

No application for development will be approved unless it includes a stormwater management plan detailing in concept how runoff and associated water quality impacts resulting from the development will be controlled or managed. This plan must be prepared by an individual approved by the **(jurisdictional stormwater authority)** and must indicate whether stormwater will be managed on-site or off-site and, if on-site, the general location and type of practices. The stormwater management plan(s) shall be referred for comment to all other interested agencies, and any comments must be addressed in a final stormwater management plan. This final plan must be signed by a licensed professional engineer (PE), who will verify that the design of all stormwater management practices meet the submittal requirements outlined in the Submittal Checklist found in the stormwater design manual. No building, grading, or sediment control permit shall be issued until a satisfactory final stormwater management plan, or a waiver thereof, shall have undergone a review and been approved by the **(jurisdictional stormwater authority)** after determining that the plan or waiver is consistent with the requirements of this ordinance.

➲ *One way to handle the submittal requirements for both the concept plan and the final design plan is to place Submittal Checklists in the stormwater design manual and require that they are used for submission of any plan. The benefit of this is that changes in submittal requirements can be made as needed without needing to revisit and alter the original ordinance. Three model checklists can be found on the Stormwater Managers Resource Center (SMRC) website at www.stormwatercenter.net.*

7.2. Stormwater Management Concept Plan Requirements

A stormwater management concept plan shall be required with all permit applications and will include sufficient information (e.g., maps, hydrologic calculations, etc) to evaluate the

environmental characteristics of the project site, the potential impacts of all proposed development of the site, both present and future, on the water resources, and the effectiveness and acceptability of the measures proposed for managing stormwater generated at the project site. The intent of this conceptual planning process is to determine the type of stormwater management measures necessary for the proposed project, and ensure adequate planning for management of stormwater runoff from future development. To accomplish this goal the following information shall be included in the concept plan:

1. A map (or maps) indicating the location of existing and proposed buildings, roads, parking areas, utilities, structural stormwater management and sediment control facilities. The map(s) will also clearly show proposed land use with tabulation of the percentage of surface area to be adapted to various uses; drainage patterns; locations of utilities, roads and easements; the limits of clearing and grading; A written description of the site plan and justification of proposed changes in natural conditions may also be required.

➲ *This project description and site plan requirement includes information normally found in an Erosion and Sediment Control plan. For local governments that do not currently have ESC plan requirements or are looking to upgrade their ESC ordinance language, there is a model Erosion and Sediment Control ordinance located at the SMRC website.*

2. Sufficient engineering analysis to show that the proposed stormwater management measures are capable of controlling runoff from the site in compliance with this ordinance and the specifications of the Stormwater Design Manual.
3. A written or graphic inventory of the natural resources at the site and surrounding area as it exists prior to the commencement of the project and a description of the watershed and its relation to the project site. This description should include a discussion of soil conditions, forest cover, topography, wetlands, and other native vegetative areas on the site. Particular attention should be paid to environmentally sensitive features that provide particular opportunities or constraints for development.
4. A written description of the required maintenance burden for any proposed stormwater management facility.
5. The **(jurisdictional stormwater authority)** may also require a concept plan to consider the maximum development potential of a site under existing zoning, regardless of whether the applicant presently intends to develop the site to its maximum potential.

For development or redevelopment occurring on a previously developed site, an applicant shall be required to include within the stormwater concept plan measures for controlling existing stormwater runoff discharges from the site in accordance with the standards of this Ordinance to the maximum extent practicable.

7.3. Final Stormwater Management Plan Requirements

After review of the stormwater management concept plan, and modifications to that plan as deemed necessary by the **(jurisdictional stormwater authority)**, a final stormwater management plan must be submitted for approval. The final stormwater management plan, in addition to the information from the concept plan, shall include all of the information required in

the Final Stormwater Management Plan checklist found in the Stormwater Design Manual. This includes:

1. Contact Information

   The name, address, and telephone number of all persons having a legal interest in the property and the tax reference number and parcel number of the property or properties affected.

2. Topographic Base Map

   A 1" = 200' topographic base map of the site which extends a minimum of___ feet beyond the limits of the proposed development and indicates existing surface water drainage including streams, ponds, culverts, ditches, and wetlands; current land use including all existing structures; locations of utilities, roads, and easements; and significant natural and manmade features not otherwise shown.

3. Calculations

   Hydrologic and hydraulic design calculations for the pre-development and post-development conditions for the design storms specified in this ordinance. Such calculations shall include (i) description of the design storm frequency, intensity and duration, (ii) time of concentration, (iii) Soil Curve Numbers or runoff coefficients, (iv) peak runoff rates and total runoff volumes for each watershed area, (v) infiltration rates, where applicable, (vi) culvert capacities, (vii) flow velocities, (viii) data on the increase in rate and volume of runoff for the design storms referenced in the Stormwater Design Manual, and (ix) documentation of sources for all computation methods and field test results.

4. Soils Information

   If a stormwater management control measure depends on the hydrologic properties of soils (e.g., infiltration basins), then a soils report shall be submitted. The soils report shall be based on on-site boring logs or soil pit profiles. The number and location of required soil borings or soil sits shall be determined based on what is needed to determine the suitability and distribution of soil types present at the location of the control measure.

5. Maintenance and Repair Plan

   The design and planning of all stormwater management facilities shall include detailed maintenance and repair procedures to ensure their continued function. These plans will identify the parts or components of a stormwater management facility that need to be maintained and the equipment and skills or training necessary. Provisions for the periodic review and evaluation of the effectiveness of the maintenance program and the need for revisions or additional maintenance procedures shall be included in the plan.

6. Landscaping plan

   The applicant must present a detailed plan for management of vegetation at the site after construction is finished, including who will be responsible for the maintenance of vegetation at the site and what practices will be employed to ensure that adequate vegetative cover is preserved. This plan must be prepared by a registered landscape architect or by the soil conservation district.

7. Maintenance Easements

The applicant must ensure access to all stormwater treatment practices at the site for the purpose of inspection and repair by securing all the maintenance easements needed on a permanent basis. These easements will be recorded with the plan and will remain in effect even with transfer of title to the property.

8. Maintenance Agreement

   The applicant must execute an easement and an inspection and maintenance agreement binding on all subsequent owners of land served by na on-site stormwater management measure in accordance with the specifications of this ordinance.

9. Erosion and Sediment Control Plans for Construction of Stormwater Management Measures

   The applicant must prepare an erosion and sediment control plan for all construction activities related to implementing any on-site stormwater management practices.

10. Other Environmental Permits

    The applicant shall assure that all other applicable environmental permits have been acquired for the site prior to approval of the final stormwater design plan.

7.4. Performance Bond/Security

The **(jurisdictional stormwater authority)** may, at its discretion, require the submittal of a performance security or bond prior to issuance of a permit in order to insure that the stormwater practices are installed by the permit holder as required by the approved stormwater management plan. The amount of the installation performance security shall be the total estimated construction cost of the stormwater management practices approved under the permit, plus 25%. The performance security shall contain forfeiture provisions for failure to complete work specified in the stormwater management plan.

The installation performance security shall be released in full only upon submission of "as built plans" and written certification by a registered professional engineer that the stormwater practice has been installed in accordance with the approved plan and other applicable provisions of this ordinance. The **(jurisdictional stormwater authority)** will make a final inspection of the stormwater practice to ensure that it is in compliance with the approved plan and the provisions of this ordinance. Provisions for a partial pro-rata release of the performance security based on the completion of various development stages can be done at the discretion of the **(jurisdictional stormwater authority)**.

➲ *Some communities elect to also require a maintenance performance security. This bond typically is set at the maintenance costs estimated in the stormwater plan for the period during which the permit holder has maintenance responsibility and is released when the responsibility for practice maintenance is passed on to another party, via an approved maintenance agreement.*

Section 8. Construction Inspection

8.1. Notice of Construction Commencement

The applicant must notify the **(jurisdictional stormwater authority)** in advance before the commencement of construction. Regular inspections of the stormwater management system

construction shall be conducted by the staff of the **(jurisdictional stormwater authority)** or certified by a professional engineer or their designee who has been approved by the jurisdictional stormwater authority. All inspections shall be documented and written reports prepared that contain the following information:

1. The date and location of the inspection;
2. Whether construction is in compliance with the approved stormwater management plan
3. Variations from the approved construction specifications
4. Any violations that exist

If any violations are found, the property owner shall be notified in writing of the nature of the violation and the required corrective actions. No added work shall proceed until any violations are corrected and all work previously completed has received approval by the **(jurisdictional stormwater authority)**.

8.2. As Built Plans

All applicants are required to submit actual "as built"plans for any stormwater management practices located on-site after final construction is completed. The plan must show the final design specifications for all stormwater management facilities and must be certified by a professional engineer. A final inspection by the **(jurisdictional stormwater authority)** is required before the release of any performance securities can occur.

8.3. Landscaping and Stabilization Requirements

Any area of land from which the natural vegetative cover has been either partially or wholly cleared or removed by development activities shall be revegetated within ten (10) days from the substantial completion of such clearing and construction. The following criteria shall apply to revegetation efforts:

Reseeding must be done with an annual or perennial cover crop accompanied by placement of straw mulch or its equivalent of sufficient coverage to control erosion until such time as the cover crop is established over ninety percent (90%) of the seeded area.

Replanting with native woody and herbaceous vegetation must be accompanied by placement of straw mulch or its equivalent of sufficient coverage to control erosion until the plantings are established and are capable of controlling erosion.

Any area of revegetation must exhibit survival of a minimum of seventy-five percent (75%) of the cover crop throughout the year immediately following revegetation. Revegetation must be repeated in successive years until the minimum seventy-five percent (75%) survival for one (1) year is achieved.

In addition to the above requirements, a landscaping plan must be submitted with the final design describing the vegetative stabilization and management techniques to be used at a site after construction is completed. This plan will explain not only how the site will be stabilized after construction, but who will be responsible for the maintenance of vegetation at the site and what practices will be employed to ensure that adequate vegetative cover is preserved. This plan must be prepared by a registered landscape architect or by the soil conservation district, and must be approved prior to receiving a permit.

Section 9. Maintenance and Repair of Stormwater Facilities

➲ *A model operation and maintenance ordinance for stormwater facilities is also available at the SMRC website. This ordinance goes into greater detail on the elements needed to create an effective stormwater maintenance ordinance. Requirements for inspection are also included in the model.*

9.1. Maintenance Easement

Prior to the issuance of any permit that has an stormwater management facility as one of the requirements of the permit, the applicant or owner of the site must execute a maintenance easement agreement that shall be binding on all subsequent owners of land served by the stormwater management facility. The agreement shall provide for access to the facility at reasonable times for periodic inspection by the **(jurisdictional stormwater authority)**, or their contractor or agent, and for regular or special assessments of property owners to ensure that the facility is maintained in proper working condition to meet design standards and any other provisions established by this ordinance. The easement agreement shall be recorded by the **(jurisdictional stormwater authority)** in the land records.

9.2. Maintenance Covenants

Maintenance of all stormwater management facilities shall be ensured through the creation of a formal maintenance covenant that must be approved by the **(jurisdictional stormwater authority)** and recorded into the land record prior to final plan approval. As part of the covenant, a schedule shall be developed for when and how often maintenance will occur to ensure proper function of the stormwater management facility. The covenant shall also include plans for periodic inspections to ensure proper performance of the facility between scheduled cleanouts.

The **(jurisdictional stormwater authority)**, in lieu of an maintenance covenant, may accept dedication of any existing or future stormwater management facility for maintenance, provided such facility meets all the requirements of this chapter and includes adequate and perpetual access and sufficient area, by easement or otherwise, for inspection and regular maintenance.

9.3. Requirements for Maintenance Covenants

All stormwater management facilities must undergo, at the minimum, an annual inspection to document maintenance and repair needs and ensure compliance with the requirements of this ordinance and accomplishment of its purposes. These needs may include; removal of silt, litter and other debris from all catch basins, inlets and drainage pipes, grass cutting and vegetation removal, and necessary replacement of landscape vegetation. Any maintenance needs found must be addressed in a timely manner, as determined by the **(jurisdictional stormwater authority)**, and the inspection and maintenance requirement may be increased as deemed necessary to ensure proper functioning of the stormwater management facility.

9.4. Inspection of Stormwater Facilities

Inspection programs may be established on any reasonable basis, including but not limited to: routine inspections; random inspections; inspections based upon complaints or other notice of possible violations; inspection of drainage basins or areas identified as higher than typical sources of sediment or other contaminants or pollutants; inspections of businesses or industries of a type associated with higher than usual discharges of contaminants or pollutants or with discharges of a type which are more likely than the typical discharge to cause violations of state or federal water or sediment quality standards or the NPDES stormwater permit; and joint inspections with other agencies inspecting under environmental or safety laws. Inspections may include, but are not limited to: reviewing maintenance and repair records; sampling discharges, surface water, groundwater, and material or water in drainage control facilities; and evaluating the condition of drainage control facilities and other stormwater treatment practices.

9.5. Right-of-Entry for Inspection

When any new drainage control facility is installed on private property, or when any new connection is made between private property and a public drainage control system, sanitary sewer or combined sewer, the property owner shall grant to the **(jurisdictional stormwater authority)** the right to enter the property at reasonable times and in a reasonable manner for the purpose of inspection. This includes the right to enter a property when it has a reasonable basis to believe that a violation of this ordinance is occurring or has occurred, and to enter when necessary for abatement of a public nuisance or correction of a violation of this ordinance.

9.6. Records of Installation and Maintenance Activities.

Parties responsible for the operation and maintenance of a stormwater management facility shall make records of the installation and of all maintenance and repairs, and shall retain the records for at least__ years. These records shall be made available to the (jurisdictional stormwater authority) during inspection of the facility and at other reasonable times upon request.

9.7 Failure to Maintain Practices

If a responsible party fails or refuses to meet the requirements of the maintenance covenant, the **(jurisdictional stormwater authority)**, after reasonable notice, may correct a violation of the design standards or maintenance needs by performing all necessary work to place the facility in proper working condition. In the event that the stormwater management facility becomes a danger to public safety or public health, the **(jurisdictional stormwater authority)** shall notify the party responsible for maintenance of the stormwater management facility in writing. Upon receipt of that notice, the responsible person shall have___ days to effect maintenance and repair of the facility in an approved manner. After proper notice, the **(jurisdictional stormwater authority)** may assess the owner(s) of the facility for the cost of repair work and any penalties; and the cost of the work shall be a lien on the property, or prorated against the beneficial users of the property, and may be placed on the tax bill and collected as ordinary taxes by the county.

Section 10. Enforcement and Penalties.

10.1. Violations

Any development activity that is commenced or is conducted contrary to this Ordinance, may be restrained by injunction or otherwise abated in a manner provided by law.

10.2. Notice of Violation.

When the **(jurisdictional stormwater authority)** determines that an activity is not being carried out in accordance with the requirements of this Ordinance, it shall issue a written notice of violation to the owner of the property. The notice of violation shall contain :

(1) the name and address of the owner or applicant;

(2) the address when available or a description of the building, structure or land upon which the violation is occurring;

(3) a statement specifying the nature of the violation;

(4) a description of the remedial measures necessary to bring the development activity into compliance with this Ordinance and a time schedule for the completion of such remedial action;

(5) a statement of the penalty or penalties that shall or may be assessed against the person to whom the notice of violation is directed;

(6) a statement that the determination of violation may be appealed to the municipality by filing a written notice of appeal within fifteen (15) days of service of notice of violation.

10.3. Stop Work Orders

Persons receiving a notice of violation will be required to halt all construction activities. This "stop work order" will be in effect until the **(jurisdictional stormwater authority)** confirms that the development activity is in compliance and the violation has been satisfactorily addressed. Failure to address a notice of violation in a timely manner can result in civil, criminal, or monetary penalties in accordance with the enforcement measures authorized in this ordinance.

10.4. Civil and Criminal Penalties

In addition to or as an alternative to any penalty provided herein or by law, any person who violates the provisions of this Ordinance shall be punished by a fine of not less than Dollars ($xx) or by imprisonment for a period not to exceed___ (xx) days, or both such fine and imprisonment. Such person shall be guilty of a separate offense for each day during which the violation occurs or continues.

10.4. Restoration of lands

Any violator may be required to restore land to its undisturbed condition. In the event that restoration is not undertaken within a reasonable time after notice, the **(jurisdictional stormwater authority)** may take necessary corrective action, the cost of which shall become a lien upon the property until paid.

10.5. Holds on Occupation Permits

Occupation permits will not be granted until a corrections to all stormwater practices have been made and accepted by the **(jurisdictional stormwater authority)**.

Approved by: _____ Date _____

References

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Maine Dept. of Environmental Protection (MDEP). 1992. Phosphorus Control in Lake Watersheds: A Technical Guide to Evaluating New Development. Augusta, Maine.

Maryland Department of the Environment (MDE). 2000. Maryland Stormwater Design Manual. Baltimore, MD.

Neller, 1988. A comparison of Channel Erosion in Small Urban and Rural Catchments, Armidale, New South Wales. Earth Surface Processes and Landforms, 13(1): 1-7

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United States Environmental Protection Agency. 1993. Guidance Specifying Management Measures for Sources if Nonpoint Pollution in Coastal Waters. EPA 840-B-92-002. USEPA, Office of Water, Washington, D.C.

United States Department of Agriculture (USDA). Natural Resources Conservation Service (NRCS). 1986. Technical Release 55: Urban Hydrology for Small Watersheds, 2nd Edition. Washington, D.C.

Walling, D. E. and J.C. Woodward. 1995. Tracing Sourcs of Suspended Sediment in River Basins: A Case Study of the River Culm, Devon, UK. Marine and Freshwater Research, 46: 324-336.

Model Post-Construction Stormwater Runoff Control Ordinance

This model ordinance is intended to be a tool for communities who are currently or may soon be responsible for meeting the stormwater management requirements of the National Pollutant Discharge Elimination System (NPDES) regulations. The goal of providing this model ordinance is to assist communities in creating their own stormwater management ordinance. In designing a model stormwater ordinance for a national audience, we purposely avoided creating too complex an ordinance, and instead tried to include suggestions for standard language and concepts that we believe a good stormwater management ordinance should contain. This ordinance should not be construed as an exhaustive listing of all the language needed for a local ordinance, but represents a good base that communities can build upon and customize to be consistent with the staff resources available in their locality. We recommend that you use this document in conjunction with other sources, such as existing ordinances created by other stormwater management programs in your geographic region that have objectives similar to your program's.

Feel free to download and alter any and all portions of this document to meet your needs. Throughout the ordinance, there are sections in which you must insert the name of the agency that you have given regulatory power over stormwater management issues in order to customize it. These sections are denoted by **bold** text placed in brackets. By using this ordinance and customizing these sections, you can create a viable local ordinance with minimal editing.

Italicized text with this symbol ➲ should be interpreted as comments, instructions, or information to assist the ordinance writer. This text *should not appear* in your final ordinance.

APPENDIX G

STORM WATER BEST MANAGEMENT PRACTICES (BMPs) OPERATION & MAINTENANCE GUIDELINES

STORMWATER BEST MANAGEMENT PRACTICES (BMPs) OPERATION AND MAINTENANCE GUIDELINES

Stormwater treatment controls should be routinely inspected and maintained to ensure that the controls are in proper working condition and operating as designed. Operation and maintenance (O&M) guidelines for common stormwater Best Management Practices (BMPs) are summarized below. Detailed maintenance requirements for specific stormwater treatment BMPs can be found in the publication "Urban Runoff Quality Management" (Water Environment Federation and American Society of Civil Engineers, 1998) and the references listed therein.

General O&M requirements for stormwater treatment controls include

Inspections: Inspections should be performed at regular intervals to ensure proper operation of stormwater BMPs. Inspections should be conducted at least annually, with additional inspections following large storm events, especially storm events that exceed the design storm for the system. Inspections should include a comprehensive visual check for evidence of the following:

- Accumulation of sediment or debris at inlet and outlet structures
- Erosion, settlement, or slope failure
- Clogging or buildup of fines on infiltration surfaces
- Vegetative stress and appropriate water levels for emergent vegetation

Routine Maintenance: Routine maintenance should be performed following inspections to ensure proper BMP operation and aesthetics. Routine maintenance should include:

- Debris and litter removal
- Silt and sediment removal
- Clearing of vegetation around flow control devices
- Maintenance and mowing of healthy vegetative cover for infiltration/filtration BMPs

Nonroutine Maintenance: Nonroutine maintenance refers to corrective measures taken to repair or rehabilitate stormwater controls to proper working condition. Nonroutine maintenance is performed as needed, typically in response to problems detected during routine maintenance and inspections, and can include:

- Erosion and structural repair
- Sediment removal and disposal
- Nuisance control (odors, mosquitoes, weeds, excessive litter)

Recommended O&M practices for specific classes of stormwater BMPs are summarized below:

1) Vegetated Swales and Filter Strips

Inspect biofilters annually and after heavy rainfall.
- Damage to vegetation by foot or vehicular traffic
- Gully erosion and evidence of concentrated bypass flows around swale/strip
- Reduction in vegetation density

Keep biofilters free of lawn debris and pet waste.
Keep inlet flow spreaders even and free of debris.
Maintain dense grass cover through periodic mowing, spot reseeding, and weed control.
Do not mow grass too close to the ground or over-apply fertilizers and pesticides.
Mow vegetation to a height above the maximum flow depth.
At end of growing season, vegetation should be at least 2 inches above the design water depth.
Remove and properly dispose of grass cuttings.
Remove sediment with a flat-bottomed shovel.
Re-seed damaged areas and cover with erosion control fabric.

2) Infiltration Trenches

Inspect trenches several times in the first few months of operation, and then annually thereafter.
If possible, conduct inspections after large storms.
Check for surface water ponding or clogging.
Periodically check pretreatment inlets of underground trenches and clean out when sediment depletes more than 10% of available capacity.
Prune or trim adjacent trees to prevent leaves from clogging the trench.
Rehabilitate trench after it becomes clogged, typically after 10 to 15 years.

3) Infiltration Basins

Inspect after major storm events in the first few months after construction. Check for:
- Standing water after 48 to 72 hours following a storm
- Upland sediment erosion
- Low spots

Inspect basin annually thereafter. Check for:
- Differential settlement, cracking, erosion, or leakage through the embankment
- Condition of the riprap in the inlet and outlet channels
- Sediment accumulation in the basin

Mow the buffer, side-slopes, and basin floor at least twice a year to discourage woody growth and control weeds.
Mow dry ponds more frequently in residential areas adjacent to residences.
Remove all litter and debris during each mowing operation.
Immediately replace/revegetate eroding or barren areas.

Annual or semi-annual tilling may be required for basins located on marginally permeable soils.
Deep tilling, regrading, and leveling typically required every 5 to 10 years.
Carefully remove the top layer of accumulated sediment after the basin has thoroughly dried out, as necessary.

4) Media Filters

Inspect semiannually and after major storm events.
Remove sediment and floatables from the:
- settling basin when 4 inches of sediment accumulates
- filter when 0.1 inches accumulates or when there is standing water over the filter 40 hours after a storm

Clean the filter surfaces twice per year by raking off dried sediment

5) Extended Detention (Dry) Basins/Retention (Wet) Ponds

Mow the upper stage, side-slopes, embankment and emergency spillway at least twice a year to discourage woody growth and control weeds.
Mow ponds more frequently in residential areas adjacent to residences.
Inspect ponds annually. If possible inspections should be conducted during wet weather.
Regular inspections of the following components should be conducted:
- Check extended detention control device for clogging
- Check upper stage pilot channel for signs of erosion
- Check the pond's bed and banks for signs of erosion
- Check the condition of the emergency spillway
- Check for accumulation of sediment around the riser

Remove accumulated debris and litter from around the extended detention control device.
Regrade and replant vegetation to correct problems with pond side-slopes, emergency spillway, and embankment.
Reduce potential nuisance conditions (i.e., odors, mosquitoes, weeds, and litter).
Remove accumulated sediment from the lower stage of the pond every 5 to 10 years, on average.

6) Constructed Wetlands

Inspect quarterly in year 1, semiannually in years 2 and 3, and annually thereafter.
Conduct inspections with the as-built pondscaping plans in hand for:
- Wetland plant species distribution/survival
- Sediment accumulation
- Water elevations
- Condition of the outlet

Clean out accumulated sediments in the forebay every 3 to 5 years. Conduct cleanouts after draining the forebay.
Mow the maintenance access, bench, and embankment twice a year to prevent woody growth.

Replant or adjust plant types depending on water levels and operating conditions.
Remove potential nuisance plant species.

7) Oil/Water Separators

Inspect monthly during the wet season.
Clean several times per year.
Always clean before the start of the wet season.
Properly dispose of removed oil.

APPENDIX H

NEW DEVELEOPMENT INSPECTION FORM

NEW DEVELOPMENT INSPECTION FORM

Project:____
BMP:____
Location:_____________________________________

INSTALLATION	MAINTENANCE			
Date Installed:___________	Inspected By:	Date Inspected	Maintenance Satisfactory?	If No, Correction Action Needed
Date Inspected:__________	1) ______________	________	☐ Yes ☐ No	__________________________
Inspected By:____________	2)______________	________	☐ Yes ☐ No	__________________________
Installation Satisfactory?	3)______________	________	☐ Yes ☐ No	__________________________
☐ Yes ☐ No	4)______________	________	☐ Yes ☐ No	__________________________
If No, Corrective Actions Needed	5)______________	________	☐ Yes ☐ No	__________________________
______________________				

BMP:____
Location:_____________________________________

INSTALLATION	MAINTENANCE			
Date Installed:___________	Inspected By:	Date Inspected	Maintenance Satisfactory?	If No, Correction Action Needed
Date Inspected:__________	1) ______________	________	☐ Yes ☐ No	__________________________
Inspected By:____________	2)______________	________	☐ Yes ☐ No	__________________________
Installation Satisfactory?	3)______________	________	☐ Yes ☐ No	__________________________
☐ Yes ☐ No	4)______________	________	☐ Yes ☐ No	__________________________
If No, Corrective Actions Needed	5)______________	________	☐ Yes ☐ No	__________________________
______________________				

BMP:____
Location:_____________________________________

INSTALLATION	MAINTENANCE			
Date Installed:___________	Inspected By:	Date Inspected	Maintenance Satisfactory?	If No, Correction Action Needed
Date Inspected:__________	1) ______________	________	☐ Yes ☐ No	__________________________
Inspected By:____________	2)______________	________	☐ Yes ☐ No	__________________________
Installation Satisfactory?	3)______________	________	☐ Yes ☐ No	__________________________
☐ Yes ☐ No	4)______________	________	☐ Yes ☐ No	__________________________
If No, Corrective Actions Needed	5)______________	________	☐ Yes ☐ No	__________________________
______________________				

APPENDIX I

CONTRACTOR SELF-INSPECTION FORM

C4.1 Construction Site Inspection Checklist

Inspected By: _____

Project: _____

Contractor: _____

Date: _____

Check "Yes" or "No" or "N/A" if not applicable.

YES	NO	N/A		
	_____		1	Has there been an absence of rain since the last inspection?
	_____		2.	Are all sediment barriers (e.g., sandbags, straw bales, and silt fences) in place in accordance with the Plan and are they functioning properly?
_____	_____		3.	If present, are all exposed slopes protected from erosion through the implementation of acceptable soil stabilization practices?
	_____	_____	4.	If present, are all sediment traps/basins installed and functioning properly (if applicable)?
_____	_____	_____	5.	Are all material handling and storage areas reasonably clean and free of spills, leaks, or other deleterious materials?
	_____	_____	6	Are all equipment storage and maintenance areas reasonably clean and free of spills, leaks, or any other deleterious materials?
	_____	_____	7.	Are all materials and equipment properly covered?
			8.	Are all external discharge points (i.e., outfalls) reasonably free of any noticeable pollutant discharges?
	_____	_____	9.	Are all internal discharge points (i.e., storm drain inlets) provided with inlet protection?

Check "Yes" or "No" or "N/A" if not applicable.

YES	NO	N/A	
			10 Are all external discharge points reasonably free of any significant erosion or sediment transport?
			11. Are all BMPs identified on the Plan installed in the proper location and according to the specifications for the plan?
			12. Are all structural control practices in good repair and maintained in functional order?
			Are all on-site traffic routes, parking, and storage of equipment and supplies restricted to areas designated in the Plan for those uses?
			14. Are all locations of temporary soil stockpiles or construction materials in approved areas?
			15. Are all seeded or landscaped areas properly maintained?
			16. Are sediment treatment controls in place at discharge points from the site?
			17. Are slopes free of significant erosion?
			18. Are all points of ingress and egress from the site provided with stabilized construction entrances?
			19. Is sediment, debris, or mud being cleaned from public roads at intersections with site access roads?
			20. Does the Plan reflect current site conditions?

If you answered "no" to any of the above questions (except Number 1), describe any corrective action(s) that must be taken to remedy the problem and when the corrective action is to be completed:

C4.2 Inspection Log

The site shall be inspected before and after storm events with 0.25 inches or greater predicted or actual precipitation, and documented on the Construction Site Inspection Checklist. Incidents of noncompliance must be reported to the Engineer.

Date	Inspector	Type of Inspection			Observations (If post-storm inspection, note size of storm in inches)
		Routine	Pre-Storm	Post-Storm	

APPENDIX J

POLLUTION PREVENTION/GOOD HOUSEKEEPING

THE PAWTUCKET NEWS

RECYCLING

FALL 2002 - Issue #4

THE OFFICIAL NEWSLETTER FOR THE CITY OF PAWTUCKET SANITATION & RECYCLING PROGRAM

COMPUTER RECYCLING A SUCCESS!

On Saturday August 17th, The City of Pawtucket collected over 9,000 lbs. of used computer equipment. Computers contain hazardous materials and should not be put out in your trash. To dispose of computer equipment, you can call Eco-Depot to make an appointment at (401) 942-1430, ext. 241.

Mike Mesolella (left) from RI Resource Recovery checks on available space while John Gomes and Luis Quadros unload computers.

LEAF COMPOSTING PROGRAM

Leaf composting bags will go on sale Tuesday, October 15th. Bags are 25 cents each. Leaf bags can be purchased at The Public Works Center, 250 Armistice Blvd., sanitation division, Monday thru Friday 8:30 a.m. to 4:30 p.m. and on Saturdays 8:00 a.m. until 12 noon. Bags may also be purchased at the Pawtucket Library during normal business hours. The Library phone number is 725-3714. You may also purchase the bags at the Transfer Station on Grotto Avenue.

DO NOT PLACE LEAVES IN THE GUTTER OR STREET.

PLASTIC BAGS CANNOT BE USED DURING THE PROGRAM.

DO NOT MIX THE LEAVES WITH GRASS OR TRASH.

If you use barrels, please keep them separate from your regular trash. Collection of leaf composting will start on Monday October 28th and continue through the month of November. City residents can transport leaves themselves to the Transfer Station on Grotto Avenue. For additional information, call 728-0500, ext. 282.

CITY OF PAWTUCKET
REFUSE COLLECTION RULES

1. **LOOSE GARBAGE WILL NOT BE PICKED UP.**
2. All refuse receptacles must be watertight and MUST have covers and two handles. Receptacles must be free from jagged or sharp edges.
3. No container may be over 32 gallons in capacity. The container may not exceed 75 lbs. in weight. OIL DRUMS ARE PROHIBITED.
4. Tree limbs and wood must be less than 3 inches in diameter and less than 3 feet in length. It must be tied and bundled in small bundles. WOOD MUST BE FREE OF ALL NAILS AND SCREWS.
5. Rugs must be cut in half and no longer than 4 ft. in length and tied.
6. No sand, dirt, sod, rocks, demolition lumber, broken concrete, asphalt, plaster, tile, brick or other construction material will be collected.
7. No automobile or motorcycle parts. No tires, motor oil or hazardous liquids.
8. If refuse is of such size and nature that it cannot be placed in containers, then it shall be so arranged next to the container so that it may be picked up by the collector. Otherwise the collector may properly refuse to take same.
9. Frozen barrels or barrels with warm ashes, sod or rocks will not be picked up. No animal waste will be picked up.
10. Mattress may be put out with your regular trash.
11. Trash is to be put out no sooner than 24 hrs. prior to pickup.
12. No full paint cans. Latex paint can be recycled in your blue recycle bin if empty. Oil paint can be disposed of by calling the Eco-Depot at (401) 942-1430, ext. 241.
13. Computers and all computer equipment should not be put out with your trash. Call the Eco-Depot at (401) 942-1430, ext. 241 to find out about dates and locations for disposing of these items.
14. Metal items must be prescheduled for pickups before putting them on the curbside. (stoves, refrigerators, washers, etc.) **Please call 728-0500 Ext. 282.**

If you have any questions, please call 728-0500, ext. 282.

CHRISTMAS TREE PICKUP

Christmas trees will be collected during the month of January. Your tree should be placed at curbside the same day as your regular trash pickup. The tree should be placed outside without plastic bags and ornaments or glitter. It will take 3 to 4 weeks to complete the pickup of all trees. If your tree has not been picked up by the end of January 2003, call 728-0500 Ext. 282 for more information.

PAINT DISPOSAL

Cans of Latex Paint can be dried up. When completely dried the empty can should be put in your blue bin and the dried up paint can be put in your regular trash. For more information call 728-0500 Ext. 282.

All Oil Base Paint must be disposed of at Eco Depot! Oil Base Paint contains hazardous materials. For an appointment to dispose of oil based paint call the Eco Depot at 941-1430 Ext. 241.

PROPANE TANKS

Propane tanks **cannot** be put out with regular trash. **20 gallon tanks only** can be brought to 250 Armistice Blvd. and dropped off at the Sanitation Dept. Please check with someone in the office before dropping off the tanks or call sanitation at 728-0500 Ext. 282. Propane tanks can also be disposed of at Eco-Depot, call (401) 942-1430, ext. 241.

TOP EIGHT RECYCLING MISTAKES

LOOSE PAPER: All paper **should be tied or put in bags** and then placed in the green bins.

RINSE ALL CONTAINERS: Please **empty and rinse** all containers before placing them in your blue bin.

OVERFILLING OF BINS: Please **don't overstuff your bins**, put the recyclables out weekly. Extra blue and green bins are available at the Public Works Center.

BEER AND SODA PACKAGING: Please do not leave the bottles in the original packaging. The **beer and soda packaging is not recyclable**. Put the packaging in your trash.

MIXING YOUR RECYCLABLES: Please **do not mix your recyclables**. The blue bin is for bottles, cans and small metals. The green bins are for cardboard and paper products.

OVERSTACKING CARDBOARD: Recycling Trucks have small areas for cardboard. Cardboard should be 12 inches in height and 3 feet x 3 feet tied and bundled. **Boxes should be flattened.**

PIZZA BOXES: Pizza boxes **are not recyclable** because of the grease from the pizza. Put these boxes in your trash.

BROKEN GLASS: Broken glass **is not recyclable** and should be placed in a box and sealed and marked as broken glass. This should be placed atop your trash cans.

Newsletter funded by a grant from RI Resource Recovery

City of Pawtucket
Mayor James E. Doyle
Public Works Department
250 Armistice Boulevard
Pawtucket, RI 02860

IMPORTANT NUMBERS

RHODE ISLAND RESOURCE RECOVERY
942-1430

ECO-DEPOT
942-1430, EXT. 241

SEWER, SANITATION, RECYCLING
728-0500, EXT. 282

APPENDIX K

STORM WATER MANAGEMENT PLAN AND SCHEUDLE

EXECUTIVE SUMMARY
STORM WATER MANAGEMENT PROGRAM PLAN SUMMARY AND SCHEDULE
CITY OF PROVIDENCE
Providence, Rhode Island

This table identifies how the Plan complies with the General Permit (RIR040000) requirements for the six minimum best management practices. While this report identifies many alternatives, the items that the City has committed to are specified in this table.

Permit Reference	Minimum Control Measure Best Management Practice (BMP) Description	Potential Responsible Party/Department	Measurable Goal	Proposed Schedule	Comments
IV.G.1	Submit Annual Report to RIDEM	City Council	Annual Report completed	March 10 of every permit year (commencing 2005)	As discussed in Section 10.2 of the SWMPP. Annual Report Template included in Appendix L
1.	**Public Education and Outreach**				
IV.B.1.b.1 and 5	Distribute Storm Water Awareness Package (Neighbor to Neighbor)	Storm Water Committee, DPW	Materials complied. Information distributed. Number of packages distributed (distributed with Recycle Bins, copies at City Hall and Library).	Start distributing media by: 3/10/2005	As discussed in Section 3.4 of the SWMPP. Example educational materials for potential use included in Appendix A.
IV.B.1.b.1 and 5	Distribute storm water flyer to residents.	Storm Water Committee	Flyer distributed annually.	Media distributed by: 3/10/2005	As discussed in Section 3.0 of the SWMPP. Example educational materials for potential use included in Appendix A.
IV.B.1.b.1 and 5	Continue school programs and meet with local school officials annually to identify past activities and upcoming curriculum.	Storm Water Committee	Annual meeting.	Meeting held by January each permit year	Continue educational programs as discussed in Section 3.2 of the SWMPP.
IV.B.1.b.1 and 5	Make the Storm Water Management Plan available to the General Public	Storm Water Committee	Make plan available at City Hall and in schools. Consider putting the plan on the City's web site.	Make copy of SWMPP and NOI available in 2004	
IV.B.1.b.2	Develop strategies to inform public (visitors, employees, residents) on how to become involved in storm water program. Develop strategy for topics and media to be used.	Storm Water Committee	Strategy decided, information packaged for chosen media(s). Information distributed to the public.	Strategy developed by: 3/10/2005 and implemented in following years.	Opportunities are discussed in Section 3.2 of the SWMPP.
IV.B.1.b.2	Develop strategies to utilize partnerships with other governmental and non-governmental entities.	Storm Water Committee	Meeting(s) held with other community groups (governmental and non-governmental). Strategy developed.	Strategy developed by: 3/10/2005 and implemented in following years	Potential partners discussed in Section 3.2 of the SWMPP.
IV.B.1.b.3	Potential target audiences are described in Section 3.3.2 of the SWMPP.	Storm Water Committee	List developed.	Developed by: 3/10/2004 and reviewed annually	
IV.B.1.b.4	Potential target pollutant sources are discussed in Section 3.3.3 of the SWMPP.	Storm Water Committee	List developed.	Developed by 3/10/2004 and reviewed annually	
IV.B.1.b.7	Evaluate the success of this minimum measure.	City Council, Storm Water Committee	Annual Report completed	March 10 of every permit year (commencing 2005)	As discussed in Section 10.0 of the SWMPP.

Permit Reference	Minimum Control Measure Best Management Practice (BMP) Description	Potential Responsible Party/Department	Measurable Goal	Proposed Schedule	Comments
2.	**Public Participation**				
IV.B.2.b.1	SWMPP was developed by storm water committee that included DPW representatives. Plan was also made available to public comment and public noticed. A public meeting was held during the preparation of the SWMPP.	Storm Water Committee	SWMPP available for review	SWMPP available for review prior to submission to RIDEM	Copy of Public Notice for the public meeting is available from the DPW Director.
IV.B.2.b.2.i	Potential target audiences are described in Section 3.3.2 of the SWMPP.	Storm Water Committee	List developed.	Developed by: 3/10/2004 and reviewed annually.	
IV.B.2.b.2.ii	Include public involvement in the City's storm water program.	Storm Water Committee	Community groups contacted. Number of public activities.	Review annually	Section 4.2 includes current public involvement activities that exist within the City.
IV.B.2.b.2.ii	Develop local storm water committee to continue to develop and implement the Plan.	City Council	Committee developed and maintained.	Developed by 9/10/2004	
IV.B.2.b.2.ii	Conduct annual Storm Water Plan meeting for the public.	Storm Water Committee	Conduct annual meeting.	Meeting conducted prior to March of every permit year (commencing 2005).	
IV.B.2.b.2.ii	Develop storm drain stenciling program.	Storm Water Committee	Program developed, volunteers organized, basins stenciled.	Organize program by 2004 Begin stenciling by 2005	
IV.B.2.b.2.ii	Sponsor and support cleanup projects.	Storm Water Committee	Program developed, volunteers organized,	Organize program by 2004 Begin cleanups by 2005	
IV.B.2.b.2.iii	Provide adequate public notice prior to submitting the annual report. Allow the public to comment and review report.	City Council, Storm Water Committee	Annual Report made available at a specified community location. Public meeting held annually.	Meeting conducted prior to March of every permit year (commencing 2005).	
IV.B.2.b.2.iii	Provide a written summary of responses for all significant comments.	City Council, Storm Water Committee	Comments reviewed, written response made available to public (if necessary)	As needed	
IV.B.2.b.4	Evaluate the success of this minimum measure.	Storm Water Committee	Annual Report completed	March of every permit year (commencing 2005).	As discussed in Section 10.0 of the SWMPP.

Permit Reference	Minimum Control Measure Best Management Practice (BMP) Description	Potential Responsible Party/Department	Measurable Goal	Proposed Schedule	Comments
3	**Illicit Discharge Detection and Elimination**				
IV.B.3.b.1	Develop an outfall map including locations of all outfalls (GPS) and names of receiving waters.	DPW	Mapping completed, consider integration of asset management system. Identify names and locations of all receiving waters.	Developed by: 12/2006	As discussed in Section 5.2 and Section 5.4 of the SWMPP.
IV.B.3.b.2	Implement outfall tagging program to identify and number outfall pipes (optional if GIS mapping is available for all outfalls in MS4).	DPW	Number of outfalls tagged. Survey of outfalls completed. Number of outfall tags maintained (if installed).	Implemented by: 12/2006	As discussed in Section 3.4.1 and Section 5.4 of the SWMPP.
IV.B.3.b.3	Additional elements shall be recorded on an on-going basis. At a minimum, field notes will be made on municipal plat maps to plot the location of additional elements that will also be used to prepare outfall mapping. These additional elements will be recorded during maintenance of drainage structures, dry weather surveys and installation of new storm drains.	DPW	Procedures developed and implemented.	Procedures developed by 12/2006	Mapping discussed in Section 5.2 and Section 5.4 of the SWMPP.
IV.B.3.b.4	Develop and introduce an ordinance or other regulatory mechanism to effectively prohibit and enforce unauthorized non storm water discharges into the system. Section 5.3 and Section 5.4 of the SWMPP identifies alternatives for the City to accomplish this.	City Council	Draft language and legal review. Conduct informational meetings as necessary.	Developed and introduced by: 12/2004	As discussed in Section 5.3 of the SWMPP. Potential model ordinances are included in Appendix B and Appendix C.
IV.B.3.b.4	Adopt an ordinance or other regulatory mechanism to effectively prohibit and enforce unauthorized non storm water discharges into the system.	City Council	Submit and schedule for vote at City Council Meeting. Regulatory mechanism in place.	Adopted by: 12/2005	As discussed in Section 5.3 of the SWMPP. Potential model ordinance included in Appendix B and Appendix C.
IV.B.3.b.5.i.	Area that drains to the Moshassuck, West, Woonasquatucket, Seekonk, and Providence Rivers and Roger Williams Park Ponds will be first priority given the pathogen impairment for these waters.	DPW	Investigations identified, prioritized, conducted. Suspected illicit connections investigated. Source identified and scheduled for removal. Enforcement actions taken or referred to other entity such as police or RIDEM.	Program implemented by: 12/2007	As discussed in Section 5.4 of the SWMPP.
IV.B.3.b.5.ii	Complaints associated with illicit discharges will be directed to the DPW where these complaints will be logged. DPW will review these complaints upon receipt and determine the appropriate action to take.	DPW	Number of complaints logged and responded to.	Complaint procedures implemented by: 12/2006.	
IV.B.3.b.iii	Procedures for tracing sources of illicit discharges are detailed in Section 5.4.3of the SWMPP.	DPW	Number of illicit connections detected.	Procedures completed	

Permit Reference	Minimum Control Measure Best Management Practice (BMP) Description	Potential Responsible Party/Department	Measurable Goal	Proposed Schedule	Comments
IV.B.3.b.iv	The process for removing illicit discharges will be defined by the mechanism that will be used to prohibit and enforce illicit discharges.	DPW	Sources identified and removed.	Adopted by: 12/2005	The regulatory mechanism will define this process which must be approved as part of its adoption.
IV.B.3.b.v	The illicit discharge and detection program will be evaluated and assessed annually prior to the preparation of the Annual Report. This will consist of reviewing the areas evaluated, findings, whether changes in procedures and priorities need to be made. A summary of this evaluation will be included in the Annual Report.	DPW	Completion of annual review.	March of every permit year (commencing 2005).	
IV.B.3.b.5.vi	Inspect all catch basins in the City at least once. Maintain records of all inspections and corrective actions required and completed. This activity will be coordinated with the recording requirements as stipulated in IV.B.3.b.3 and cleaning activities required in IV.B.6. During these inspections, odors or flow and any other observations will be noted and reported for the purposes of determining whether illicit discharges should be investigated discharging to those structures.	DPW	Number of catch basins inspected. Records maintained. Number of corrective measures required and completed.	Inspections completed by: 12/2007	
IV.B.3.b.5.vii	Perform dry weather surveys in accordance with procedures established in Section 5.4 of the report. Perform a minimum of two surveys in accordance with standards stipulated in the General Permit.	DPW	Two sampling events completed.	Surveys completed by: 12/2007	
IV.B.3.b.7	If illicit discharges are detected from other physically interconnected MS4s, the City will report the finding to the owner of the illicit discharge.	DPW	Number of illicit discharges reported to other MS4 owners.	Process in place by: 12/2006	
IV.B.3.b.8	Unauthorized non-storm water discharges that are deemed appropriate to continue discharging to the storm drain system will be referred to the RIPDES program for appropriate action. Process will follow procedures developed by the RIPDES program for such a review.	DPW	Number of illicit discharges referred to RIDEM.	Process in place by: 12/2006.	
IV.B.3.b.9	Public education and municipal employee training programs will inform about hazards associated with illegal discharges and improper disposal of waste. Coordinate with Minimum Measure #1 and 6.	Storm Water Committee	Ensure that educational materials developed include illicit discharge awareness. Materials developed and distributed.	Materials selected, distribution commenced 12/2007	As discussed in Section 3.0 and Section 5.4 of the SWMPP.

Permit Reference	Minimum Control Measure Best Management Practice (BMP) Description	Potential Responsible Party/Department	Measurable Goal	Proposed Schedule	Comments
IV.B.3.b.10	All actions taken to detect and address illicit discharges will be recorded in both field notes as well as on outfall mapping prepared for IV.B.3.b.1.	DPW	Submittal of findings in Annual Report.	March of every permit year (commencing 2005).	
IV.B.3.b.12	Evaluate the success of this minimum measure.	City Council, Storm Water Committee	Annual Report completed	March of every permit year (commencing 2005)	As discussed in Section 10.0 of the SWMPP.

Permit Reference	Minimum Control Measure Best Management Practice (BMP) Description	Potential Responsible Party/Department	Measurable Goal	Proposed Schedule	Comments
4	**Construction Site Runoff Control**				
IV.B.4.b.1 and 3	Develop and introduce an ordinance or other regulatory mechanism to require sediment and erosion control and control of other wastes at construction sites. Section 6.3 and Section 6.4 of the SWMPP identifies alternatives for the City to accomplish this. The Rhode Island Soil Erosion and Sediment Control Handbook (as amended) will serve as the minimum standard.	City Council	Draft language and legal review. Conduct informational meetings as necessary.	Developed and introduced by: 12/2004	
IV.B.4.b.1	Adopt an ordinance or other regulatory mechanism to require sediment and erosion control and control of other wastes at construction sites.	City Council	Submit and schedule for vote at City Council Meeting. Regulatory mechanism in place.	Adopted by: 12/2005	As discussed in Section 6.3 of the SWMPP.
IV.B.4.b.2	Issue and track permits for all construction projects resulting in land disturbance of greater than 1 acre to ensure compliance with erosion and sediment control ordinance. Permit issuance procedures will be defined in the ordinance. Current tracking procedures will be reviewed and amended as necessary to comply with this program.	Building Official	Review current procedures. Improved procedure developed and implemented. Number of permits issued and tracked.	Developed by: 12/2005	As discussed in Section 6.2 and Section 6.3 of the SWMPP.
IV.B.4.b.4	Procedures for reviewing plans and SWPPPs for construction projects resulting in land disturbance of 1-5 acres, not reviewed by other State programs will be defined in the ordinance developed to comply with IV.B.4.b.1 and 2.	DPW, City Council, Storm Water Committee	Ordinance developed. Number of plans and SWPPPs reviewed.	Develop by: 12/2004 100% reviewed by: 12/2006	As discussed in Section 6.3 and Section 6.4 of the SWMPP
IV.B.4.b.5	Develop procedures for coordination of site plan and SWPPP review when relying on State program review of construction activity.	DPW, City Council, Storm Water Committee	Procedure developed.	Procedures implemented by: 12/2005	
IV.B.4.b.6	Public comment and information regarding new development projects and construction runoff related impacts will be directed to the Building Department where these complaints will be logged. The Building Department will review these complaints upon receipt and determine the appropriate action to take. Develop procedures for receipt and consideration of information submitted by the public.	Building Department	Procedure developed. Number of complaints logged and responded to.	Complaint procedures implemented by: 12/2006.	

EXECUTIVE SUMMARY
STORM WATER MANAGEMENT PROGRAM PLAN SUMMARY AND SCHEDULE
CITY OF PROVIDENCE
Providence, Rhode Island

Permit Reference	Minimum Control Measure Best Management Practice (BMP) Description	Potential Responsible Party/Department	Measurable Goal	Proposed Schedule	Comments
IV.B.4.b.7	Procedures for site inspection and enforcement of erosion and sediment control measures and other measures for control of wastes at construction sites will be defined in the ordinance developed to comply with IV.B.4.b.1 and 2.	City Council	Review current procedures. Improved procedure developed and implemented.	Procedures implemented by: 12/2005	As discussed in Section 6.3 and Section 6.4 of the SWMPP. A sample of a contractor self-inspection report is included in Appendix D.
IV.B.4.b.7	Inspect 100% construction twice (1st during construction, 2nd after final stabilization)	Building Department	Staff trained. Number of construction sites inspect and number of occurrences per site.	Start: 12/2005	
IV.B.4.b.8	Develop procedures for referral to the State of non-compliant construction site operators.	DPW, City Council, Storm Water Committee	Procedure developed. Number of non-compliant construction sites referred to RIDEM.	Process in place by: 12/2005	
IV.B.4.b.10	Evaluate the success of this minimum measure.	City Council, Storm Water Committee	Annual Report completed	March 10th of every permit year (commencing 2005)	As discussed in Section 10.0 of the SWMPP.

Permit Reference	Minimum Control Measure Best Management Practice (BMP) Description	Potential Responsible Party/Department	Measurable Goal	Proposed Schedule	Comments
5	**Post-Construction Runoff Control**				
IV.B.5.b.1, 2 and 8	The City will rely on the State of Rhode Island Stormwater Design and Installation Manual (as amended) as a standard to address storm water runoff from new development and redevelopment projects. At this time, no additional modifications are proposed especially since the new manual is soon to be released by RIDEM.	City Planner	Program developed, priority areas specified.	Program in place by: 12/2005	As discussed in Section 7.0. A model watershed management plan is included in Appendix D.
IV.B.5.b.3	Procedures for pre-application meetings and site plan review (coordinate IV.B.4.b.4) will be developed as part of the development of new ordinances as described in IV.B.5.b.9.	City Planner	Procedures developed, number of pre-application meetings held.	Process in place by: 12/2005	
IV.B.5.b.4	Review 100% of plans and SWPPPs for development projects resulting in land disturbance greater than 1 acre, not reviewed by other State programs (coordinate with IV.B.4.b.4). Procedures will be developed as part of the development of new ordinances as described in IV.B.5.b.9.	City Planner	Number of plans and SWPPPs reviewed.	Start: 12/2005	
IV.B.5.b.5	Procedures for coordination of local and State post-construction storm water management reviews. Procedures will be developed as part of the development of new ordinances as described in IV.B.5.b.9.	DPW, City Council, Storm Water Committee	Procedures developed.	Process in place by: 12/2005	
IV.B.5.b.6	New industrial discharges proposed to discharge to discharge to the storm drain system will be referred to the RIPDES program for review and approval. Process will follow procedures developed by the RIPDES program for such a review.	DPW, City Council, Storm Water Committee	Number of activities referred to RIDEM.	Process in place by: 12/2005	
IV.B.5.b.7	When the City's Comprehensive Plan of Development is updated, opportunities for smart growth such as in-fill development, direct growth to identified areas, and protect sensitive areas will be identified. Additionally, non-structural BMPs as described in the State of Rhode Island Stormwater Design and Installation Manual (as amended) will be considered. Public education will include discussion of ways to limit runoff.	DPW, City Council, Storm Water Committee	Items developed and distributed.	Materials selected, distribution commenced by 12/2007	As discussed in Section 3.0 and Section 7.3.

EXECUTIVE SUMMARY
STORM WATER MANAGEMENT PROGRAM PLAN SUMMARY AND SCHEDULE
CITY OF PROVIDENCE
Providence, Rhode Island

Permit Reference	Minimum Control Measure Best Management Practice (BMP) Description	Potential Responsible Party/Department	Measurable Goal	Proposed Schedule	Comments
IV.B.5.b.7 and 9	Develop and introduce an ordinance or other regulatory mechanism to address post construction runoff from new development and redevelopment projects. State standards will be included by reference. Section 7.3 and Section 7.4 of the SWMPP identifies alternatives for the City to accomplish this.	City Council	Draft language and legal review. Conduct informational meetings as necessary.	Developed and introduced by: 12/2004	As discussed in Section 7.2, Section 7.3, and Section 7.4. Model ordinance is included in Appendix F.
IV.B.5.b.9	Adopt an ordinance or other regulatory mechanism to address post construction runoff from new development and redevelopment projects.	City Council	Submit and schedule for vote at City Council Meeting. Regulatory mechanism in place.	Adopted by: 12/2005	As discussed in Section 7.2, Section 7.3, and Section 7.4.2. Model ordinance is included in Appendix F.
IV.B.5.b.10	Inspect 100% construction sites after final stabilization (coordinate with IV.B.4.b.7). Procedures will be developed as part of the development of new ordinances as described in IV.B.5.b.9.	Building Department	Number of construction sites inspected.	Start: 12/2005	As discussed in Section 7.3.
IV.B.5.b.11-12	Adopt by-law or regulations with language and enforceable mechanism for long term operation and maintenance of post-construction runoff controls. Include language will provide DPW authority to ensure proper operation and maintenance of all BMPs tributary to the storm sewer system. Procedures will be developed as part of the development of new ordinances as described in IV.B.5.b.9.	City Council	By-law or regulation developed. Submit and schedule for vote at City Council Meeting. Voted and adopted.	Adopted by: 12/2005	As discussed in Section 7.3 and Section 7.4. Suggested BMP operation and maintenance guidelines are included in Appendix H.
IV.B.5.b.14	Evaluate the success of this minimum measure.	Storm Water Committee	Annual Report completed	March of every permit year (commencing 2005)	As discussed in Section 10.0 of the SWMPP.

Permit Reference	Minimum Control Measure Best Management Practice (BMP) Description	Potential Responsible Party/Department	Measurable Goal	Proposed Schedule	Comments
6	**Pollution Prevention and Good Housekeeping in Municipal Operations**				
IV.B.6.b.1.i	Identify and list locations and description of all structural BMPs owned or operated by the MS4.	DPW	Number of structures identified.	Initial list: 3/2004 Update: March 10th of every year.	As discussed in Section 8.2.2 of the SWMPP.
IV.B.6.b.1.ii	Formalize procedures for inspections, cleaning and repair of detention/retention basins, storm sewers, and catch basins. The City is already conducting these tasks.	DPW	Identify the structures tributary to the system. Conduct a catch basin sediment accumulation pilot program. Establish a routine inspection and maintenance program. Maintain records of inspections conducted, number of structures cleaned, approximate volume of material collected.	Developed: 12/2005	As discussed in Section 8.7 of the SWMPP.
IV.B.6.b.1.iii	Formalize current catch basin inspection and cleaning program. All catch basins will be inspected annually and cleaned as necessary unless documentation supporting a different frequency of cleaning is submitted to RIDEM as part of the Annual Report.	DPW	Formalized existing program. Number of catch basins inspected and number cleaned.	Developed by: 12/2005 Annually commencing 12/2006	As discussed in Section 8.7 of the SWMPP.
IV.B.6.b.1.iv	DPW staff will observe road shoulders during road work projects. If erosion is observed, the crew will report it to its manager. DPW will then schedule repairs and appropriate methods for stabilization including riprap or vegetative stabilization.	DPW	Procedures implemented developed	Developed by: 12/2005	
IV.B.6.b.1.vi	Formalize current street and road sweeping program. City will continue to sweep all roads and streets once per year.	DPW	Maintain records of curb-miles swept, approximate volume of material collected.	Formalized by: 12/2006 Annually commencing 12/2006	As discussed in Section 8.7 of the SWMPP.
IV.B.6.b.1.vii	Develop program for controls to reduce floatables and other pollutants from the MS4. This program will be based on a review of current catch basin grates and their ability to bypass flows to a curb inlet, as well as observation of outfalls to determine locations with the greatest potential for floatables. A pilot program is proposed to evaluate the effectiveness of any floatable reduction strategy.	DPW	Program developed, volume of wastes collected and disposed.	Program developed by: 12/2005.	
IV.B.6.b.1.viii	City will continue to dispose of wastes removed from the MS4 in accordance with applicable State requirements.	DPW, Storm Water Committee	Waste disposed of properly.	Reviewed annually	As discussed in Section 8.7 of the SWMPP.

EXECUTIVE SUMMARY
STORM WATER MANAGEMENT PROGRAM PLAN SUMMARY AND SCHEDULE
CITY OF PROVIDENCE
Providence, Rhode Island

Permit Reference	Minimum Control Measure Best Management Practice (BMP) Description	Potential Responsible Party/Department	Measurable Goal	Proposed Schedule	Comments
IV.B.6.b.2	Operations under MS4s legal control that have the potential to introduce pollutants into the storm water system are addressed in Section 8.0.	DPW, Storm Water Committee		Completed by: 3/2004	
IV.B.6.b.3	Industrial facilities owned and operated by MS4s that have storm water discharges associated with industrial activities have been listed on the NOI.	DPW, Storm Water Committee	Facilities identified on NOI.	Completed by: 3/2004	
IV.B.6.b.4	Operation and maintenance and good housekeeping practices and BMPs for municipal operations have been identified in Section 8.0.	DPW, Storm Water Committee	Continue to implement	Implementation by: 3/2006	As discussed in Section 8.7 of the SWMPP.
IV.B.6.b.6	Incorporate storm water awareness training into existing training for equipment operators and mechanics (Heath & Safety, Right to Know)	DPW, City Council	Training completed. Educational materials distributed.	Procedures developed: 12/2006	As discussed in Section 8.7.
IV.B.6.b.7	Develop procedures to incorporate water quality improvements into flow management projects.	DPW, City Council	Procedures developed	Procedures developed: 12/2007	
IV.B.6.b.8	Develop procedures for implementing proper erosion and sediment and water quality controls for all construction projects undertaken by the City.	DPW, City Council	Procedures developed	Procedures developed: 12/2006	
IV.B.6.b.8	Include a list of planned capital improvements in the Annual Report.	DPW, City Council, Storm Water Committee	Meeting held to discuss municipality's needs. Improvements assessed and listed.	March of every permit year (commencing 2005)	
IV.B.6.b.10	Evaluate the success of this minimum measure.	City Council, Storm Water Committee	Annual Report completed	March of every permit year (commencing 2005)	As discussed in Section 10.0 of the SWMPP.

APPENDIX L

ANNUAL REPORT TEMPLATE

STORM WATER MANAGEMENT
ANNUAL REPORT

NAME OF CLIENT
City, State

DATE

STORM WATER MANAGEMENT
ANNUAL REPORT
Client Name

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NAME OF REPORT
Client Name

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4.0 ILLICIT DISCHARGE DETECTION/ELIMINATION

4.1 Illicit Discharge Investigation Activities

Location	Type	Date Identified	Identified By	Estimated Flow	Scheduled for Repair

4.2 Illicit Discharge Removal Activities

Location	Type	Date Removed	Removed By	Cost

4.3 Modifications to Plan

4.4 Planned for Next Year

5.0 CONSTRUCTION SITE RUNOFF CONTROLS

5.1 Construction Plans Reviewed

5.2 Construction Activities Commenced

5.3 Construction Sites Inspected

5.4 Modifications to Plans

5.5 Activities Planned for Next Year

Name	Site	Type	Date Reviewed	Date Commenced	Date Inspected

6.0 POST CONSTRUCTION STORM WATER MANAGEMENT

6.1 Structures Installed

6.2 Structures Inspected

6.3 Modifications to Plan

6.4 Activities Planned Next Year

Project	Site	Type Structure	Date Installed	Date Inspected

7.0 POLLUTION PREVENTION/GOOD HOUSEKEEPING

7.1 Employee Training Conducted

7.2 Street Sweeping

Curb miles swept, # material removed

7.3 Snow Removal

7.4 Catch Basin Cleaning

cleaned, # material removed

7.5 Preventative Maintenance Activities

Work order tracking

7.6 Complaint Responses

7.7 Spill Response Activities

7.8 Transfer Station

7.9 Municipal Waste Disposal

7.10 Municipal Recycle

7.11 Household Hazardous Waste Collection

7.12 Municipal Facility Inspection

Appendix C

7.13 Modification to Plan

7.14 Activities Planned Next Year