



# **Pennichuck Brook Urban Runoff Project**

**April 2000**

**Prepared by the  
Nashua Regional Planning Commission**

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Nonpoint Source Program Local Initiative Grant  
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## Project Summary and Goals

The goal of the *Pennichuck Brook Urban Stormwater Project* is to decrease the impacts of urban runoff on the Holt Brook tributary and the Pennichuck Brook watershed. Accomplishing this goal involved:

- Diverting the untreated discharge through a multi-cell stormwater treatment system
- Educating the businesses in the drainage area on the negative impacts of NPS and accidental spills on the city's public water supply
- Increasing public awareness of the link between the stormwater drainage system and the public drinking water supply through a storm drain stenciling program
- Demonstrating the effectiveness of low technology urban runoff management practices on water resources
- Encouraging local planning boards to incorporate urban runoff best management practices in the designs of future development in the communities

## Introduction

Through regulation and education, the impact of point sources of pollution have been reduced and the focus has shifted to nonpoint sources of pollution. The *New Hampshire Nonpoint Source Pollution Management Plan*, published in 1999 by the NH Department of Environmental Services, identifies urban runoff as the primary area of concern for impacts to water quality in the State. The Pennichuck Brook system is the major water supply source for the Nashua region and serves as Pennichuck Water Works primary source of water (approximately 75 percent). Portions of the Pennichuck Brook watershed are impacted by urban runoff from industrial, commercial and high density residential uses as well as the region's major transportation networks, the FE Everett Turnpike and NH Route 101A. This project deals with the impacts of urban runoff on the Pennichuck Brook system and includes both the construction of structural measures and educational efforts to reduce the impacts of nonpoint source pollution on the region's most important public water supply source.

The *Pennichuck Brook Urban Runoff Project* focuses on treating the discharge from the stormwater outfall with the greatest impact on water quality in the Pennichuck Brook. The outfall is located along a highly urbanized section of the NH Route 101A corridor in Nashua, more specifically on a NH Department of Transportation (DOT) easement on the NH Technical College property. The drainage area of the outfall is approximately 79 acres with an estimated impervious coverage of 60 percent. Fifty-two catch basins collect stormwater runoff from the streets, residential neighborhoods and parking lots of the roughly 60 businesses in the drainage area. See Sheet 1 of 2 in Appendix A.

The drainage area contains such varied uses as car washes, gas stations, automobile oil and lubrication services, automobile muffler and brake services, dry cleaners, restaurants and retail establishments. The threat of an accidental spill contaminating the Pennichuck Brook system is very real. In December of 1994, an accidental oil spill at the Greased Lightning facility leaked into a floor drain, which was connected to a storm drain, and was discharged to the Holt Pond tributary at the outfall behind the NH Technical College. Given the types of businesses within the drainage area and within the greater watershed, increasing awareness of the potential negative impact of business or individual actions on the public drinking water supply is an important aspect of the project. Information and educational tools developed for this project can be utilized throughout the Pennichuck Brook watershed and can also be transferred to other communities.

Development within the Pennichuck Brook watershed continues and local planning boards need to become better informed about the negative impacts of stormwater runoff on water quality. The project will provide the boards with hard evidence on the effectiveness of this particular stormwater treatment



measure. The results of the water quality monitoring will be forwarded to the Planning Boards and Health Officials when they become available. The Planning Board education component of the project aims to provide boards with better information on which to make stormwater management decisions. Nineteen people throughout the region participated in the Stormwater Management Workshop held on December 9, 1999. Subsequent workshops have been held comparing the different types and effectiveness of stormwater treatment systems. The NRPC will continue to keep municipalities apprised of new technologies through the REPP III Quarterly Water Resources meetings. The towns are also submitting projects to the NHDES Year 2000 Biomonitoring Program through the Watershed Bureau's Biology Division.

## Project Tasks

**Task 1. Engineering Design and Specifications:** The site was surveyed by a licensed land surveyor and the treatment system was designed in conjunction with the NH DES. The treatment system is a sequence of multiple treatment cells, each with a particular treatment function. The system will treat up to a 10-year storm (40-CFS) and encompasses about .75% of the total watershed area. The system will remove pollutants via sedimentation, filtration, biological uptake and chemical reduction. See Appendix A for the location of the treatment cells and their functions.

**Task 2. Construction and Inspection:** West Environmental, Inc monitored the entire construction of the stormwater treatment wetland. The excavation was performed by Audrey Construction in the summer of 1998. Park Construction graded the site in September. Extensive dewatering was necessary for construction equipment in the basin areas. Twelve inches of topsoil was spread over the medium to fine subsoil to provide a good planting medium. A.J. Cameron Sod Farms, Inc. performed the landscaping at the site and plant materials were purchased from New England Wetland Plants. Planting was completed in mid-October. See Appendix B for the plant material invoice, a photo log of construction, and follow up inspection report.

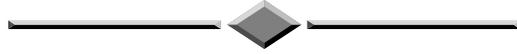
**Task 3. Water Quality Monitoring:** Monitoring was postponed for a year to allow the wetland vegetation to take hold and give a better indication of the materials that are trapped and settled out in the system. Despite a very dry season, 80% of the vegetation planted survived. Wet weather water quality monitoring will be conducted at four sites within the treatment system. Samples will be analyzed for E-coli, dissolved oxygen, nitrates, ammonia, petroleum hydrocarbons, TKN, total suspended solids, phosphorous and drinking water detection limits for RCRA regulated metals. Pennichuck Water Works has contracted the analyses of all parameters to a certified laboratory. Ten sampling runs will be conducted by Pennichuck staff. A Quality Assurance Project Plan (QAPP), describing the monitoring plan and quality assurance/quality control measures has been submitted to the US EPA. See Appendix C. The results of the water quality monitoring will be forwarded as a supplemental report upon approval of the QAPP and completion of sampling.

**Task 4. Education Program:** The education component of the project consisted of creating a pamphlet and compiling a packet of information on non-point sources (NPS) of pollution and Best Management Practices (BMPs) developed by New Hampshire Department of Environmental Services (NH DES). The larger businesses in the stormwater drainage area were visited and presented an overview of the project and supplied with the educational packets. The majority of the 21 businesses were interested in the project and willing to read through the material provided. See Appendix D for the educational materials. The 52 public storm drain inlets in the area were stenciled "Dump No Waste/Protect Your Water" to alert the public of the fate of runoff water and materials carried with it from streets, parking areas, and landscaped areas. To increase employee awareness, NRPC will stencil drains on private property with the permission of the owner.



**Task 5. Planning Board Education Program:** A training workshop on NPS, BMPs, alternative technologies, and effective buffers was held on December 9, 1999 for planning boards, municipal planners, conservation commissions and enforcement officials in the Pennichuck Brook watershed. See Appendix E.

**Task 6. Supplemental Final Report:** A discussion of the results of the ten wet weather water quality monitoring results will be supplied upon their completion.



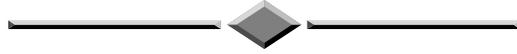
# Appendix A

## Treatment Cell Locations and Their Functions



## The Treatment Cell Functions

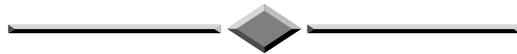
1. ***Sediment Forebay*** - This bay of the sedimentation basin is small and readily accessible for cleaning by heavy equipment without having to enter it. This bay will capture most of the heavy grits and sands being discharged into the treatment system from the storm drainage. The presence of this forebay will extend the life of the sedimentation basin between cleanings.
2. ***Sediment Bay*** - This larger sedimentation follows the sediment forebay and will remove smaller particulate matter. Its detention time and depth are such that cleaning will require equipment to enter into basin. The basin is equipped with an oil water separator at its outlet, which allows the basin to drain slowly between storms.
3. ***Oil/Water Separator*** - This will capture the floating oils that are present in stormwater stream that are not in solution. Vac trucks can access this separator to remove the collected oils.
4. ***Marsh Channel*** - This part of the treatment process is a vegetated wetland and will reduce nutrient loadings through biological uptake.
5. ***Wet Pond*** - The wet pond provides for additional nutrient uptake, final sedimentation, groundwater infiltration, and wildlife habitat.
6. ***Rip Rap Check Dams*** - These dams serve as filters as low flows can flow through them, allowing for fines to be captured in the gravel face of each check dam.

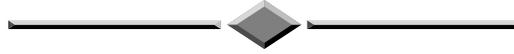


## **Appendix B**

**Plant Material Invoice**  
**Construction Photo Log**  
**Follow-Up Inspection Report**

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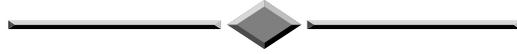


# Appendix C

## Quality Assurance Project Plan

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# **Appendix D**

**Business Education Program  
Informational Packet**



### Businesses Visited in Drainage Area

<b>Businesses on West Side 101A</b>	<b>Address in Nashua</b>	<b>Type of Business</b>
Sunnyside Acura	482 Amherst St.	Car dealer
Fleet Bank	488 Amherst St.	Bank
Child Learning Center	1 Deerwood Dr.	Child Care
R White Equipment Center, Inc.	93 Deerwood	Small engine repair
Bay Bank	500 Amherst St.	Bank
Greased Lightning	504 Amherst St.	Garage
Midas Muffler	518 Amherst St.	Garage
Lowell Paper Box Co.	23 Dumaine St.	Paper manufacturing
522 Plaza Management Co.	522 Amherst St.	10 different stores
Flextec Inc. Printing	3 State St.	Printing
Architectural Interior Products	6 State St.	Manufacturing
Modular Laboratory Systems	8 State St.	Manufacturing
Paperworks, Inc.	9 State St.	Manufacturing
White Pine Inc.	1 Capitol St.	Paper manufacturing
Kollsman	3 Capitol St.	Manufacturing
<b>Businesses on East Side 101A</b>	<b>Address in Nashua</b>	<b>Type of Business</b>
491 Plaza Management Co.	491 Amherst St.	Six different businesses
493 Plaza Management Co.	493 Amherst St.	Thirteen Retail businesses
Peter's Pharmacy	495 Amherst St.	Retail
Richdale Dairy Store	495 Amherst St.	Retail
Ciao's Pizza	495 Amherst St.	Food
Enterprise Rent-a-Car	495 Amherst St.	Car rental



## **Appendix E**

### **Planning Board Education Program Stormwater Management Workshop Agenda**

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