

Nashawannuck

Pond



Watershed Restoration Project
Project No. 1998-05/319



Prepared by
Pioneer Valley Planning Commission
Nashawannuck Pond Restoration Project Advisory Committee

NASHAWANNUCK POND WATERSHED RESTORATION PROJECT

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Prepared by
Pioneer Valley Planning Commission with the
Nashawannuck Pond Restoration Project Advisory Committee

Prepared for:

Massachusetts Department of Environmental Protection
Bureau of Resource Protection

And

U.S. Environmental Protection Agency
Region I

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- Appendix A: Advisory Committee Meeting Agendas and Minutes
- Appendix B: Notice of Intent and Order of Conditions DEP File No. 151-181
- Appendix C: Construction Conformance letter and Nashawannuck Pond Bank Restoration Project construction plans, set of 9 sheets, prepared by Baystate Environmental Consultants, Inc. (not to scale)
- Appendix D: QAPP Field Forms and Before and After Photographs of the Stabilization Sites
- Appendix E: Workshop Agenda and Organization Actions
- Appendix F: Nashawannuck Pond Watershed Project Educational Demonstration Sites, set of 22 sheets, prepared by Conway School of Landscape Design (not to scale)
- Appendix G: Quality Assurance Project Plan Summary
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- Appendix I: Williston Northampton School Demonstration Site

S ECTION ONE: INTRODUCTION

1.1 Project Description

Introduction

Nashawannuck Pond is located in the central area of the City of Easthampton. The Pond was created in 1846 by the impoundment of three tributaries: Broad Brook, White Brook and Wilton Brook. These surface tributaries, along with stormwater, precipitation and groundwater, contribute water to the Pond. A dam located at the northern end of the Pond serves to impound the Pond, while the water level is controlled by an adjustable bascule gate at the dam. Water flows over the gate and into a concrete sluiceway which runs under Route 141 (Cottage Street). After passing under and through a brick factory complex, the water flows into Lower Mill Pond. The water flow continues to the Manhan River and eventually into the Connecticut River, via the Oxbow.

The Pond was originally created to provide power to the city's manufacturing businesses. The Pond has since become a prominent fixture, used for fishing, boating, and, in the past, for swimming. Today, the Pond provides recreational and aesthetic value to the community and also acts as an amenity for the neighboring business district.

Over the past several decades, the Pond has been significantly reduced in size from sediment loading. This increase in silt and sediment has caused eutrophication and dense macrophytic growth. This has greatly reduced the quality of recreation and fishing on the pond. Heavy phosphorus loading resulting from constant sedimentation in the Pond is accelerating the weed growth. The phosphorus loads also travel to the downstream waters of the Lower Mill Pond, Manhan River, Oxbow and Connecticut River.

In 1988, Baystate Environmental Consultants, Inc. prepared a Diagnostic/Feasibility Study (1988 D/F Study) for the management of the Pond. This study recommended eight steps to improve the water quality of the Pond. These recommendations are:

1. Conduct a drawdown of the pond;
2. Conduct a bottom water release to remove anoxic water and promote mixing and oxygenation;
3. Instigate a vigorous nonpoint source reduction program in the watershed to reduce nutrient loading;
4. Install low stone gabion weirs in the upper arms of the pond to provide for both wetland protection during drawdown and mitigation of watershed erosion;
5. Dredge bottom deposits from the center of the pond;
6. Reduce the influence of stormwater flows from storm drain systems near the pond;

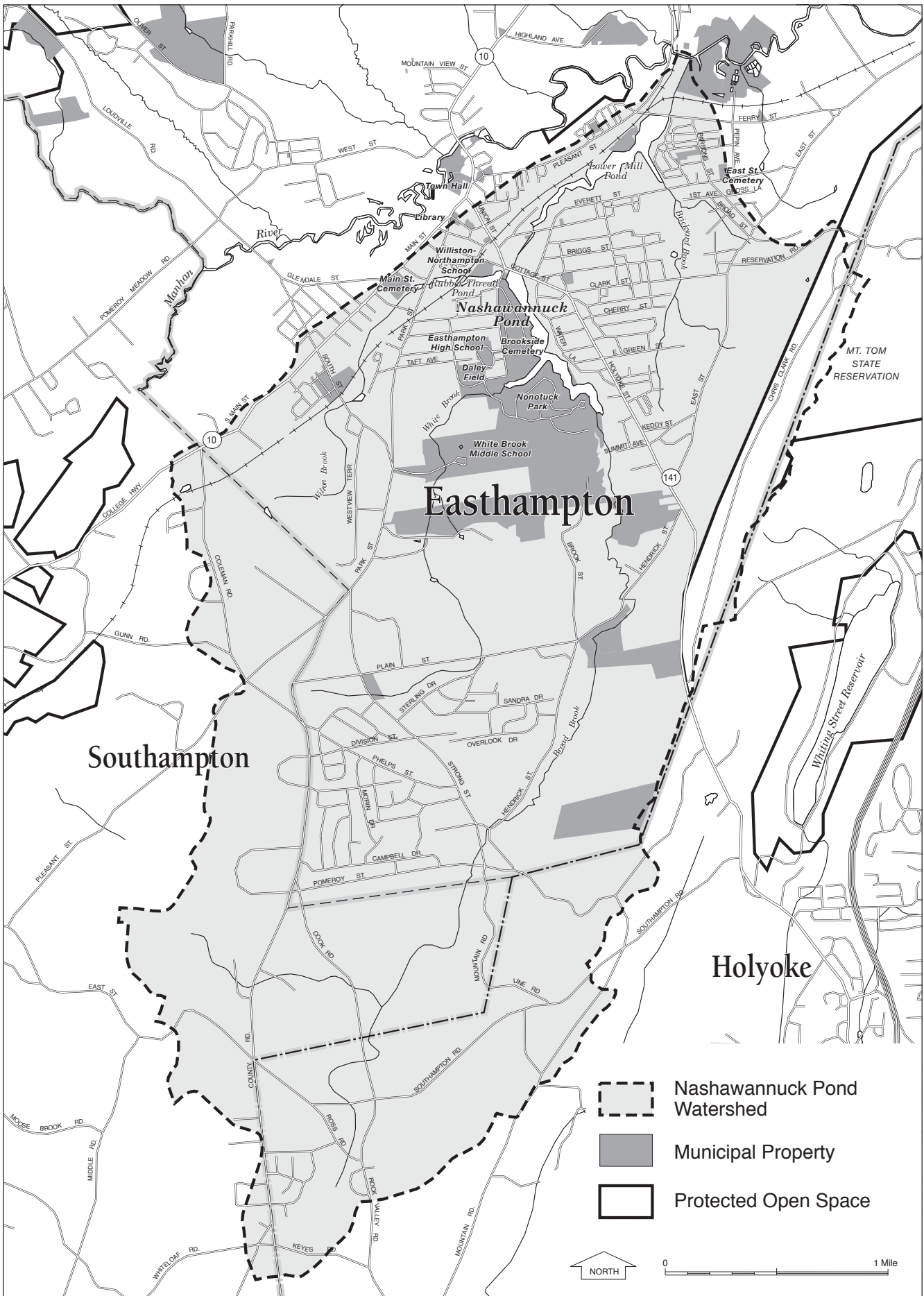
7. Promote the concepts of sound "urban housekeeping" in the vicinity of the Pond by providing funds for an educational program; and
8. Stabilize and rebuild four badly eroded 'points' on the shoreline of the Pond and provide improved structures to control access by pedestrians and fishermen.

Easthampton residents have contributed time and money through the Nashawannuck Pond Steering Committee for the development of numerous projects recommended in the 1988 D/F Study. Projects that have been undertaken include conducting a drawdown and bottom water release; and installing a gabion weir in White Brook and a sedimentation basin in Broad Brook.

The subject project of this report focuses on recommendations #7 and #8 from the 1988 D/F study. The City of Easthampton is also embarking on a project partially funded through the §319 program to install Vortechs catch basins and deep sump catch basins within the Pond's watershed, addressing recommendation #6.

The one remaining recommendation from the 1988 D/F Study to be addressed consists of dredging the Pond. The City is seeking funding from the Executive Office of Environmental Affairs and the Army Corps of Engineers to perform a feasibility study for dredging activities.

The Nashawannuck Pond Steering Committee has worked diligently to fund and complete the various Pond improvement projects. The Committee has conducted outreach through the newspapers, the Fall Festival, the annual fishing derby and various fundraising events. Public outreach was also a significant part of this project with the development of a brochure aimed at residents within the watershed and distribution at the 1999 and 2000 Fall Festivals of the brochure and other information related to the Pond and environmentally-friendly practices.



Project Goals

Nashawannuck Pond, which serves as an economic, environmental and recreational focal point, is experiencing eutrophication and dense macrophytic growth as a result of sediment and nutrient loading. The present state of the Pond has limited its recreational and aesthetic functions. This project builds on the work that has already been accomplished and achieves the following goals:

- Educate watershed residents and public officials on watershed issues and how they can reduce nonpoint source pollution.
- Eliminate sources of erosion in the immediate area of the pond.
- Gain public and political support for further water quality improvements.

1.2 Project Work Program

Task I: Formation of a QAPP for Monitoring

Pioneer Valley Planning Commission (PVPC), working with the City of Easthampton and the Department of Environmental Protection, prepared a Quality Assurance Project Plan (QAPP) for monitoring to assess the success and long-term viability of bank stabilization and Best Management Practices (BMPs). The QAPP provides for monitoring to occur both before and after installation of selected BMPs. Monitoring consists of pre- and post-construction photographic and vegetative surveys to document the changes at the four stabilization sites. The number and species of vegetation at the sites are documented to determine the success of the bank revegetation.

Monitoring of the sites consists of photographic surveys and completion of vegetation field sheets for all four erosion areas assessing pre-construction and post-construction conditions. Post-construction monitoring is ongoing through three consecutive growing seasons (June 2001, July 2002, and July 2003).

The photographic surveys of the site will document changes. Accuracy is ensured by having the monitors take photographs of each site from an identified location. Completed field forms and photographic surveys will be spot-checked for accuracy by the Data Manager identified in the QAPP. The Data Manager will replicate monitoring (field form completion and photographic surveys) at one site per monitoring event. A divergence of greater than 20% between the Data Manager's results and the monitoring team's results will trigger a meeting between the monitors and the Data Manager to discuss monitoring results and protocols. Retraining of monitors will occur as needed to ensure accuracy and precision.

Monitors will work in teams of two, documenting conditions at each site. Results will be compared on site for precision. If there is a divergence of greater than 20% in the results of the two monitors, the Data Manager and the monitors will review the site together and discuss the

results. The Data Manager will also monitor the site and will compare his monitoring results with the results of the monitoring team.

Task II: Nashawannuck Pond Restoration Project Advisory Committee Meetings

City officials, concerned citizens and representatives from the Department and the Natural Resource Conservation Service came together to form the Nashawannuck Pond Restoration Project Advisory Committee. PVPC met with this Committee seventeen (17) times over the course of the project. Copies of meeting agendas and minutes are included in Appendix A. The Advisory Committee assisted with the Information/Outreach Sessions and provided guidance over the various aspects of project implementation

Task III: Bank Stabilization

PVPC hired Baystate Environmental Consultants, Inc. (BEC) to finalize the bank stabilization engineering and landscape drawings from the 1988 D/F Study. BEC updated the drawings to incorporate the use of plant materials to control erosion and sedimentation. BEC and the City prepared a Notice of Intent, which was submitted to the Easthampton Conservation Commission. Subsequently, an Order of Conditions, DEP File No. 151-181 (See Appendix B) was issued for the proposed work. The Order of Conditions was the only permit required for this work.

BEC developed bid documents and a contractor was hired to perform the work. Construction commenced in the fall of 2000 and was completed in spring of 2001. Design plans and before and after photographs of the stabilization sites are included as Appendices C and D.

Task IV: Watershed Nonpoint Source Education Information/Outreach Sessions

PVPC, the City of Easthampton and the Nashawannuck Pond Restoration Project Advisory Committee sponsored two information/outreach sessions as part of this project. The first information/outreach session was a booth in the City's annual Fall Festival in 1999. The booth, which was staffed by PVPC and members of the Nashawannuck Pond Restoration Project Advisory Committee for the full two days of the Fall Festival, followed the theme of "Nashawannuck Pond: What's Going On?" Pre-construction photographs of the stabilization areas were displayed at the booth and various educational brochures, including the brochure developed through this project, were distributed to those interested.

The second information/outreach session was a workshop at the City Hall on March 2, 2001 aimed at various city officials, boards and organizations who affect the Pond. The workshop was developed to update the attendees on the work that has been performed at the Pond, the outstanding issues, work that another community has performed to address water quality issues and to identify what steps the attendees can take to improve the water quality at the Pond. Attendees discussed their current practices and steps that they can

take in the future. The workshop agenda and actions developed are included as Appendix E. See Section 4.1 for additional information on the outreach performed as part of this project.

Demonstration Sites

PVPC and the Advisory Committee identified three sites within the Nashawannuck Pond watershed to be used as demonstration sites. PVPC hired The Conway School of Landscape Design to prepare drawings of three demonstration sites depicting recommended Best Management Practices. The demonstration sites included:

- An undeveloped lot in a new subdivision located within the watershed.
- An existing single-family residential property with maintained lawn up to the banks of a tributary to the Pond.
- The Town Beach, which is a publicly accessible resource that has unvegetated, eroding slopes located at the edge of the Pond.

The demonstration sites were chosen for their location within the watershed and their possible contributions to sedimentation and nutrient loading of Nashawannuck Pond. Details regarding the demonstration sites and the recommended Best Management Practices are described in Section 4.2 of this document. Copies of the plans developed by The Conway School of Landscape Design are included as Appendix F. The BMPs could not be implemented at the three demonstration sites. A fourth site was chosen for the incorporation of demonstration BMPs. Williston Northampton School incorporated the use of native wetland plantings as a buffer and filter instead of the extension of fertilized grassed areas along the edge of their newly constructed athletic fields. Additional information on the implementation of this BMP is included in Section 4.2.

Brochure

PVPC developed an information brochure entitled “What You Can Do to Help Nashawannuck Pond.” The brochure describes the Pond, threats to the Pond, best management practices and highlights the demonstration sites. Five hundred copies of the brochure were printed. Approximately 75 brochures were distributed at the 1999 and 2000 Fall Festivals and will continue to be distributed to the community residents at future public events.

1.3 Project Finances

A total of \$116,500 was committed to this project from various sources. This project was financed in part with federal funds from the Environmental Protection Agency to the Massachusetts Department of Environmental Protection under a §319 competitive grant. The §319 funds accounted for \$45,000. The City of Easthampton provided a local match of \$40,000. An additional \$7,500 was obtained from the Natural Resources Conservation Service through the

Wildlife Habitat Incentives Program. The Florence Savings Bank made a generous donation of \$24,000 towards construction activities at the restabilization sites.

A breakdown of the major costs associated with this project follows.

Permitting, engineering & construction oversight	\$27,154.00
Construction activities	\$67,359.39
Demonstration Sites Design	\$ 2,529.00
Brochure printing costs	\$ 905.40

1.4 The Planning Process

Public Involvement

An advisory committee, comprised of municipal officials, concerned citizens, and representatives from the Department of Environmental Protection and the Executive Office of Environmental Affairs, guided the planning for this project. The advisory committee met seventeen (17) times over the course of this project. The members spent considerable time and effort assisting in collecting information, developing the brochure, staffing the booth at the Fall Festival, reviewing best management practices and demonstration projects, and reviewing the design plans for the bank stabilization construction aspect.

The Nashawannuck Pond Restoration Project Advisory Committee consisted of:

Michael Tautznik, Mayor
Stuart Beckley, City Planner
Patty Gambarini, concerned citizen
Gary Golas, Conservation Commission and Nashawannuck Pond Steering Committee
Gail LaBarge, Planning Board
Susan Mantler, Nashawannuck Pond Steering Committee
Paul Nowak, Nashawannuck Pond Steering Committee
John O’Leary, Executive Office of Environmental Affairs
Jane Peirce, Department of Environmental Protection
Joseph Sananiello, Planning Board
Chester Seklecki, Planning Board
John Watling, Pascommuck Conservation Trust and Nashawannuck Pond Steering Committee

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SECTION TWO: POLLUTION ISSUES FACING NASHAWANNUCK POND

The primary threat to Nashawannuck Pond is nonpoint source pollution, such as excess fertilizers and sediments, flowing from the surrounding watershed. The City of Easthampton and organizations such as the Nashawannuck Pond Steering Committee and the Nashawannuck Pond Restoration Project Advisory Committee have been working together to restore the health and recreational potential of the Pond.

According to the “Diagnostic/Feasibility Study for the Management of Nashawannuck Pond” prepared by Baystate Environmental Consultants, Inc. in 1988, phosphorus levels at the Pond were 692 kg/yr and nitrogen levels were 17,347 kg/yr. These nutrients enter the Pond via its three tributaries, Broad Brook, White Brook and Wilton Brook, storm runoff, benthic remineralization, aquatic wildlife, atmospheric deposition and groundwater. Once in the Pond, the nutrients stimulate the growth of aquatic vegetation.

The immediate area surrounding the Pond, consists of the cemetery, Route 141 (Cottage Street), several businesses and several residences. Residential and transportation uses constitute a significant portion of Nashawannuck Pond’s watershed. Agricultural uses and recreational uses can also be found in the watershed. These uses contribute to nonpoint source pollution, which is the result of rainfall or snowmelt moving over and through the ground picking up pollutants within the storm water’s path. These pollutants are eventually deposited into wetlands, streams, underground sources of water, and the Pond.

Practices associated with the maintenance of the watershed uses effect the Pond in various ways. For instance, many of the residences have lush lawns that extend to the banks of the Pond and its tributaries. Fertilizers and pesticides used on the lawns runoff into the Pond and its tributaries after a rainstorm. The lawns also transport storm water more quickly than denser vegetation, which traps storm water, allowing it to percolate into the ground. The area roadway system is also a source of nonpoint pollution into the Pond and its watershed. Nonpoint pollutants within the Pond’s watershed include:

- excess fertilizers, herbicides, and insecticides from residential areas;
- oil, grease, toxic chemicals, and heavy metals deposited by automobiles on roadways, parking lots, and driveways;
- sediment from improperly managed construction sites, crop and forested lands, and eroding stream banks;
- salt and sand from roads and parking lots;
- bacteria from livestock, pet wastes, and faulty septic systems.

Nonpoint pollution issues that were addressed through this §319 project are described below.

2.1 Nutrients

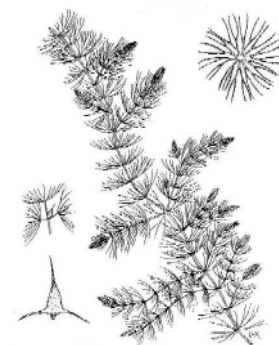
Nutrients are essential for the growth of organisms such as plants. However, applying more nutrients, or fertilizers such as phosphorous and nitrogen, than the plants can absorb results in the excess being carried away by rain, or stormwater, and eventually being deposited in the Pond. Too many plants or “weeds” in the Pond negatively affect the Pond and the species that inhabit the Pond in several ways, such as:

- the weeds spread aggressively, forming dense vegetated areas that impede the usual uses of the waterbody, such as boating and fishing. The weeds consume significant levels of dissolved oxygen in the water, which means there is less oxygen available for the other species in the Pond, like fish. Fish that are adapted to the eutrophic conditions are pan and rough fish, which are less desirable species for fishing.
- when the plants annually die off, the decomposition of the vegetation reduces oxygen levels even more, and stimulates anaerobic activity in the Pond, which results in algae growth.

The typical weeds that are growing in Nashawannuck Pond are American waterweed (*Elodea canadensis*) and coontail (*Ceratophyllum demersum*).



American water weed
(*Elodea canadensis*)



Coontail
(*Ceratophyllum demersum*)

2.2 Herbicides, Pesticides

Herbicides and pesticides, like nutrients, can enter the Pond through runoff from lawns, recreational fields and agricultural uses within the watershed. As the herbicides and pesticides flow over-land and eventually reach the Pond, they may destroy beneficial plants and insects. The result is decreased species diversity, and an imbalance in the species composition within the Pond and the surrounding watershed. Although there have been no hard tests to confirm the absence or presence of herbicide or pesticide residuals in the Pond, it is important for property owners within the watershed to understand the possible repercussions of chemical use.

2.3 Stormwater Runoff

As rain falls on the earth, some of it is absorbed by plants or permeates into the soil. Rain that is not absorbed once it reaches the earth is called stormwater runoff. As the stormwater flows across the land surface, it carries with it soil and pollutants such as fertilizers, herbicides, other chemicals such as oil and gasoline, and animal waste.

Over the course of the past decades, the watershed of Nashawannuck Pond has become increasingly developed. This development has resulted in a decrease in vegetation and an increase in impervious surfaces (driveways and roads), thereby decreasing the amount of rainwater that can infiltrate. In addition to the quantity of water that is flowing overland, the speed or velocity of the water also increases over impervious surfaces and maintained lawns. Erosion increases with an increase in the flow and velocity of storm water.

Sediment, or soil particles that are carried by stormwater runoff and deposited in water bodies, may be a result of erosion or road sanding. Sediment may carry additional pollutants, like fertilizers and other chemical compounds, to the water resource. Nashawannuck Pond receives a tremendous amount of sediment from the surrounding watershed, including runoff carrying road sand from area roadways and erosion from certain areas of the Pond's banks, including the four stabilization sites addressed through this grant. Natural erosion is also occurring along the banks of the Pond and within the channels of the tributaries to the Pond. It should be noted that sedimentation of the Pond over the past few decades correlates to an increase in development within the watershed.



Pre-existing bank conditions at stabilization Area 2.

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SECTION THREE: SELECTED BMPs

Through this project, various Best Management Practices (BMPs) were identified as being applicable to both existing and proposed residential uses within the watershed. Sedimentation and erosion from sources immediately adjacent to the Pond and within the Pond's watershed are of major concern. As documented in the 1988 D/F Study, nutrients and sediments are entering the Pond from land uses within the watershed.

The following BMPs were determined to be appropriate for implementation by the property owners within the Pond's watershed. These BMPs were incorporated into the design of the demonstration sites and the educational brochure.

3.1 Minimize Fertilizer Use

- Fertilizers contain nitrates and phosphates, which stimulate the growth of aquatic vegetation, and also cause algae blooms that can lead to fish kills. If possible, watershed residents should avoid fertilizing their lawns.
- Mulching or other organic gardening methods can be used to achieve the desired fertilization results; if fertilizer is required, watershed residents should choose one that contains no phosphorus.
- Fertilizer application should be avoided during the summer and fall. Turf grass demand for nutrients is low at this time and unused fertilizer is more likely to end up in the Pond.
- Over application of fertilizers should also be avoided. Watershed residents should have their soil tested to determine what additional nutrients are needed.

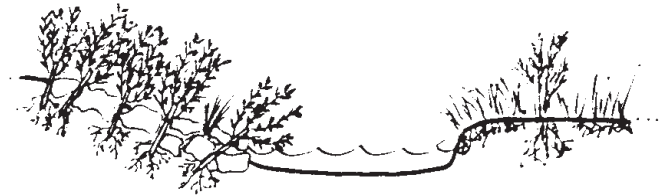
3.2 Reduce the Use of Pesticides, Herbicides and Insecticides

- Many household products made to exterminate pests are also toxic to humans, pets, wildlife, fish, small aquatic organisms and plants.
- Natural pest control methods should be used when ever possible. If pesticides and herbicides are required, watershed residents should read the labels carefully to determine the correct application amounts. Lawn chemicals should not be applied right before it rains.

3.3 Maintain Slope Stability

- Watershed residents can stabilize slopes with deep-rooted vegetation to increase stormwater infiltration and decrease erosion.
- Steep slopes can also be decreased with retaining walls and terraces.

- Streambanks can be stabilized by planting deep-rooted shrubs along the banks.



Streambank with deep rooted plants

3.4 Minimize Impermeable Surfaces

- Permeable pavement like gravel, instead of cement or asphalt, will allow for increased infiltration of stormwater.
- Watershed residents can limit areas requiring impervious surfaces like driveways, patios and parking lots.
- Areas of grass lawn, which can form a mat of dense vegetation that prevents infiltration and encourages stormwater runoff, should be minimized.

3.5 Use Low Maintenance Landscaping Techniques

- Native vegetation requires less chemical additives, such as fertilizers and pesticides, to encourage growth and requires less watering.
- Watershed residents can establish the smallest lawn that satisfies their recreational needs.
- Native sedges, wildflower meadows and gardens can be used as alternatives to lawn.

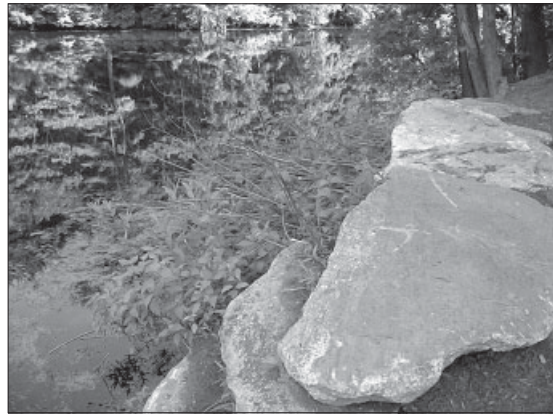
3.6 Control Stormwater Runoff On-Site

- Runoff from a property can be directed into a rain/wetland garden or vegetated swale to slow the flow of water and increase infiltration.
- Planting trees and other deep-rooted vegetation, like dogwoods, will increase absorption of stormwater.
- Maintaining or restoring vegetated riparian buffers along streams will decrease stormwater runoff velocities and allow for natural pollutant attenuation through the vegetation.
- All soil surfaces should be vegetated or mulched to encourage infiltration and reduce erosion.

- Roof-runoff can be directed into a barrel for later use in watering lawns and gardens.
- Downspouts from roof gutters should be aimed away from foundations and paved surfaces.
- For roofs without gutters, residents can plant grass, spread mulch, or use gravel under the drip line to prevent soil erosion and increase the ground's capacity to absorb water.



Downspout into dry well



Vegetated Stone Wall constructed at Area 2.

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SECTION FOUR: DEMONSTRATION SITES/COMMUNITY EDUCATION

One of the main goals of the project was to inform the community on efforts that have been and are being taken to improve the water quality of Nashawannuck Pond. This was accomplished through two information/outreach sessions, the creation and distribution of an informative brochure, the development of case studies for three sites within the watershed, and the use of BMPs at a fourth demonstration site.

4.1 Information/Outreach Sessions

PVPC and the City of Easthampton sponsored two information/outreach sessions as part of this project. The first information/outreach session was a booth in the City's annual Fall Festival in 1999. The booth, which was staffed with PVPC and the Nashawannuck Pond Restoration Project Advisory Committee for the full two days of the Fall Festival, followed the theme of "Nashawannuck Pond: What's Going On?" The purpose of the booth was to inform residents about this project and other past and present efforts that are focused on making the Pond a healthy ecosystem and providing for public access/recreational opportunities, as well as what residents can do to help restore the Pond.

Materials presented at the booth included the following:

- Nashawannuck Pond Brochure;
- Photos of the Pond and the four erosion areas that were slated for stabilization;
- Fact sheets and brochures regarding nonpoint source pollution, aquatic vegetation and phosphorous, etc.;
- The preliminary design plans from BEC developed through this grant;
- The BMPs and design plans of the three watershed demonstration sites prepared by The Conway School of Landscape Design; and
- Examples of common household sources of nonpoint source pollution including paint thinner, motor oil, fertilizers, herbicides/pesticides, etc.

Twenty-one residents signed up for additional information at the booth. The information package consisted of the following information:

- "Don't Trash Grass" composting brochure, Department of Environmental Protection;
- "Home Composting, A guide for composting yard and food waste," Department of Environmental Protection;
- "Home Composting Bin Design Sheets," Department of Environmental Protection;
- "Getting the Phosphates Out: Restrictions on the phosphorus content of household cleaning products in Massachusetts," Department of Environmental Protection;

- "Gardening for Wildlife," National Wildlife Federation;
- Reduce Yard Size brochure, National Wildlife Federation;
- Underground Storage Tank multi-page fact sheet, Department of Environmental Protection;
- Fact sheet on Safer Alternatives for Toxic Products;
- Fact sheets on Motor Oil & Oil Filters, Paints & Stains, and Pesticides; and
- "Plant List for Streambank and Riparian Corridor Restoration in the Nashawannuck Pond Watershed."

Similar information was available from the Nashawannuck Pond Steering Committee at a booth at the 2000 Fall Festival. The booths seemed to attract a moderate amount of interest from attendees. Approximately 75 "What You Can Do to Help Nashawannuck Pond" brochures were distributed during the two Fall Festivals.

The second information/outreach session was a workshop held on March 2, 2001 at the City Hall aimed at various city officials, boards and organizations that affect the Pond. Attendees included the Mayor, the City Planner and the City Engineer. The following organizations were also represented: the Conservation Commission, the Nashawannuck Pond Steering Committee, Williston-Northampton School, the Brookside Cemetery Committee, the Department of Public Works, the School Department, Parks and Recreation Department, and the Planning Board.

The workshop served to update the attendees on the work that has been performed at the Pond, identify outstanding issues, and present another community's experience in addressing water quality issues as well as to identify future steps to improve the water quality at the Pond. An action plan was created identifying various tasks and responsibilities developed by the attendees. Paul Nowak, chair of the Nashawannuck Pond Steering Committee, presented an update of the work that has been ongoing at the Pond, including the construction of a weir at White Brook, sedimentation basin at Broad Brook and the four stabilization sites being addressed through this grant. Peter Coffin from the UMass extension discussed various best management practices to address nonpoint pollution.

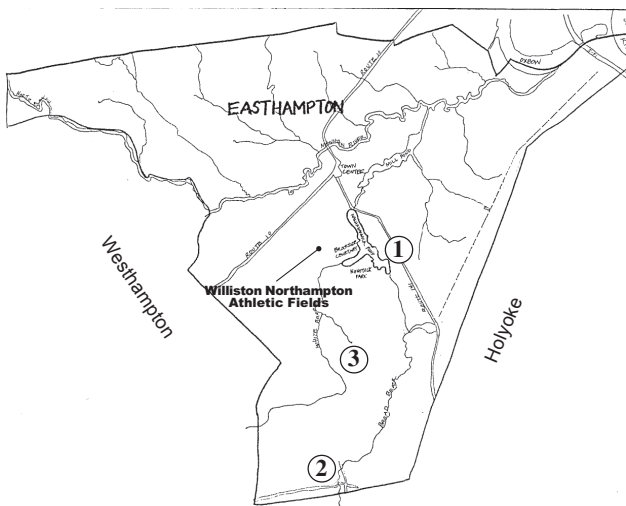
Georganne Hoyman presented work that the Springfield Department of Public Works undertook at recreation waterbodies, Lake Lorraine and Fivemile Pond. Springfield's effort was made possible through a cooperative effort including the Department of Public Works, Conservation Commission and Parks and Recreation, Department of Environmental Protection and PVPC. Springfield's project

included the installation of infiltration basins near the end of seven stormwater outfalls; the repair of eroding land adjacent to Lake Lorraine; and public outreach through educational fact sheets and public information presentations. The Lake Lorraine and Fivemile Pond Project demonstrated alternative solutions to address nonpoint source pollution and to promote community awareness.

The attendees then discussed work that they were doing or would like to do to improve conditions at the Pond. Actions ranged from revising subdivision regulations (Planning Board and Department), to better coordination with the Conservation Commission (Williston Northampton School), to focusing on education (Nashawannuck Pond Steering Committee). An action plan was developed and is included as Appendix E.

4.2 Demonstration Sites

The City of Easthampton, the Advisory Committee and Pioneer Valley Planning Commission identified three sites as educational demonstration areas. Conway School of Landscape Design (CSLD) prepared case studies for each site utilizing good watershed management practices. The three sites are described below. Plans and figures prepared for the demonstration sites are included as Appendix F.

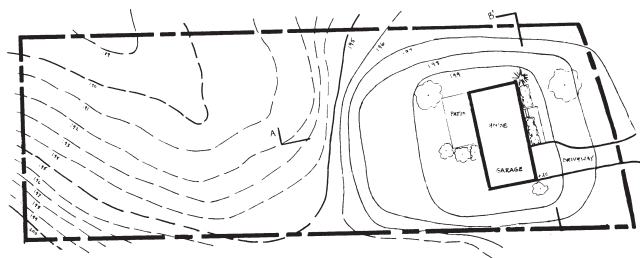


Site 1: Lot 12, Pheasant Run Estates

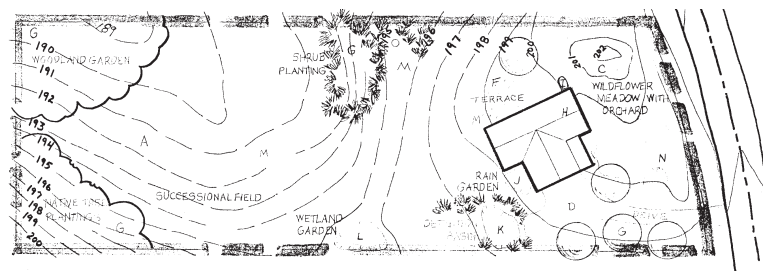
Pheasant Run Estates is a residential subdivision located adjacent to White Brook and within the watershed of the Pond. This subdivision comprises approximately 40 acres of land and the creation of 33 one-acre residential lots. Typical features of development lots within this subdivision and other subdivisions within the watershed contribute to nonpoint source pollution, and include the clearing of vegetation, direction of drainage off-site, and the presence and maintenance of extensive lawn area. These standard subdivision features made this site attractive as a demonstration area to show alternatives to the typical new lot

construction. The lot used for the demonstration project was not adjacent to any waterbodies or waterways. CSLD provided several recommendations for a more environmentally friendly development. This educational demonstration site featured several differences from a “typical” residential subdivision. The proposed Best Management Practices for this site include:

- Preservation of existing vegetation on-site;
- Planting of deep-rooted native trees and shrubs on steep slopes;
- Minimization of overall site disturbance to preserve existing drainage patterns as much as possible;
- Minimization of impermeable surfaces by creating the smallest driveway area possible;
- Reduction of lawn area to reflect true recreational use;
- Use of flagstones underlain by a permeable bed of sand and gravel for terraces and patios;
- Creation of a rooftop runoff collection system to supply water for the lawn and garden; and
- Incorporation of a detention basin or grassed swale to filter runoff from the driveway.



Typical Subdivision Lot Layout



Site 1 Demonstration Rendering Plan

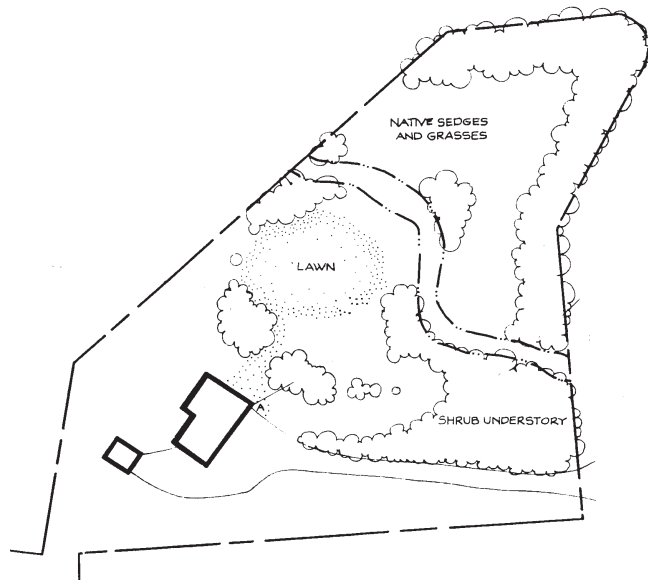
Site 2: Broad Brook Property

Site 2 represents a single-family residential property with a stream crossing through it. This property is located upstream of Nashawannuck Pond, straddling Broad Brook, a tributary to the Pond. The property owner maintains a grassed lawn area extending down to the bank of Broad Brook on both sides. Broad Brook is approximately eight (8) feet wide in this area. Several trees are located in the riparian area; however, there is no understory or leaf litter.

The area under the trees is mowed lawn area. While the bank is stable in its current condition, it is vulnerable to erosion and destabilization in severe storm events.

CSLD provided several recommendations for a more environmentally friendly development. This educational demonstration site featured several improvements to minimize nonpoint source pollution from runoff from the lawn. The proposed Best Management Practices for this site include:

- Planting steep slopes with deep-rooted plants;
- Stabilization of stream banks with vegetation along the banks of the stream;
- Reduction of lawn area to reflect true recreational use;
- Placement of lawn area on the most level area to maximize the lawn's ability to hold and infiltrate stormwater thereby minimizing stormwater flow rates;
- Plant lawns with native sedges and other vegetation that do not require fertilization, watering or mowing.



Site 2 Demonstration Plan

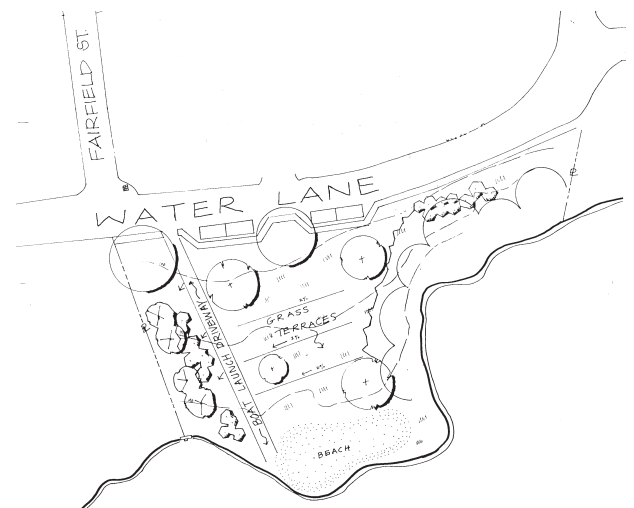
Site 3: Town Beach

The Town Beach was chosen as a demonstration site because of its visible nature and the current degraded condition. A steep, unvegetated embankment extends from Water Lane down to the Pond. This site has been used as a roadway snow storage area and a dumping ground for neighborhood yard wastes. According to Mayor Tautznik, Easthampton Department of Public Works no longer uses the Town Beach area for snow storage and instead removes the snow from the area. The asphalt driveway at the top of the slope combined with the unvegetated steep slope down to the Pond results in increased erosion and sedimentation because there is no vegetation to slow the runoff down and promote infiltration.

CSLD provided several recommendations for a more environmentally friendly development. This educational

demonstration site featured several improvements to minimize erosion and the resulting nonpoint source pollution from the site. The proposed Best Management Practices for this site include:

- Create a formal boat launch ramp;
- Provide parking just off Water Lane;
- Planting the southeastern slopes with woody vegetation;
- Discontinue all dumping practices including snow storage and residential yard wastes;
- Vegetate all soil surfaces with native species;
- Manage invasive exotic species;
- Create a vegetated swale or depression to slow down runoff and allow sediments to settle before reaching the Pond; and
- Stabilize the slopes with vegetation and terracing to reduce the risk of severe erosion.



Site 3 Demonstration Plan

It was not feasible to implement the best management practices at the three demonstration sites. The Pheasant Run lot was subject to the developer's and new home owner's requirements; the owner of the residence on Broad Brook allowed his property to be used for design purposes but chose not to implement the identified BMPs; and the Town Beach may be used as a staging area for a future dredging project. BMPs at the Town Beach may be incorporated after the dredging project is completed. Therefore, a fourth site, athletic fields at the Williston Northampton School, was chosen as the implementation site. The BMP implemented was the use of native wetland plantings as a buffer and filter instead of the extension of grassed and fertilized areas. The plantings consisted of eight silky dogwoods and eight red-osier dogwoods in a 1000+square foot area. The dogwoods were planted alongside a retention basin at the edge of newly constructed athletic fields owned by the Williston Northampton School. The plantings decrease the area of fertilized lawn within the watershed and provide for the natural uptake of nutrients in stormwater runoff from the athletic field.

4.3 Watershed Management Brochure

In September 1999, PVPC with the Nashawannuck Pond Restoration Project Advisory Committee published a watershed management brochure entitled "What You Can Do to Help Nashawannuck Pond." This brochure includes background information on the Pond, a map depicting the location of the Pond's watershed, a list of threats to the Pond, and best management practices that can be used by citizens to improve the water quality within the Pond's watershed. The brochure also included descriptions and drawings of the demonstration sites.

The brochure is in the form of a fold-up two-sided poster. This brochure was distributed to the community citizens at the project's booth at the 1999 and 2000 Fall Festival and to community officials at the March workshop. The content of the brochure targeted the average watershed citizen. The brochure aimed to educate citizens on what they can do on an individual basis in their own homes and yards to contribute to water quality improvements of the Pond.



Site 1 Demonstration Rendering

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SECTION FIVE: BANK STABILIZATION

One water quality improvement recommendation identified in the 1988 D/F Study was the stabilization and reconstruction of four badly eroded “points” on the shoreline of the Pond including the installation of improved structures to control access by pedestrians and fishermen. Preliminary designs for the stabilization sites were prepared as part of the 1988 D/F Study. PVPC hired Baystate Environmental Consultants, Inc. (BEC) to revise the designs for the four sites to incorporate the use of plant materials to control erosion and sedimentation, to assist in the permitting of the project and to provide construction documents and construction assistance.

The design plans incorporated redirection of runoff, installation of timber slope checks, stone walls and vegetated stone walls, placement of boulders at vehicular access points, placement of topsoil and shredded bark, seeding and planting.

A Quality Assurance Project Plan (QAPP) was developed to document the success of the bank stabilization. Documentation required under the QAPP include photographs and vegetated surveys of the stabilization sites. Photographic surveys were taken of each of the sites before and after construction to create visual documentation of the success of the project. Volunteer monitors filled out vegetative survey forms to track the before and after conditions at each site. Volunteer monitoring will continue for three years after the construction is completed to track the progress and effectiveness of the plantings.

The construction was funded from a variety of sources including this \$319 grant, a cash match from city funds, a grant from Natural Resource and Conservation Service Wetlands Habitat Incentive Program, and a generous contribution from the Florence Savings Bank. Descriptions of the work performed at each site are provided below.

BEC and the City of Easthampton prepared and submitted a Notice of Intent for the proposed work to the Easthampton Conservation Commission. The Commission reviewed the project and issued an Order of Conditions DEP File No. 151-181 on September 27, 1999. The Order of Conditions approved work within the 100-foot buffer zone to resource areas and the following resource areas: Bordering Land Subject to Flooding, Land Under Water and Bank. The project was exempt from the requirements of the DEP Stormwater Management Policy. Conditions included general conditions related to Wetlands Protection Act and

Easthampton Conservation Commission requirements, grading/erosion control requirements and debris/waste requirements. The Order of Conditions was the only permit required and obtained for the stabilization work.

BEC prepared a bid package with plans and specifications for the proposed work. Reduced versions of the plans are included as Appendix C. Construction documents were issued by bidding April 19, 2000. A pre-bid meeting and site visit was held on May 3, 2000. The bidding closed with the official bid opening on May 24, 2000. Three contractors placed bids on the project. BEC reviewed the bids and identified the apparent and real low bidders, both being Northern Construction. The apparent low bid is the lowest bid read at the time the bids are opened, while the real low bidder is the bidder with the lowest bid after bids are scrutinized for content and consistency with the bid package.

Based on the bid review by BEC, Easthampton selected Northern Construction as the contractor for the project. Work was authorized in the fall of 2000. The fall/winter was determined to be the best time of year to perform the stabilization activities to minimize impact on the summer recreation season and on the existing vegetation. Planting and seeding were performed in the spring of 2001. Before and after pictures of the four stabilization areas are included as Appendix D.

5.1 Area 1

Area 1 is located on the western side of the Pond, and is located immediately adjacent to the Brookside Cemetery. Stormwater runoff from the cemetery access road directs sediment to this site. Area 1 has also suffered erosion from the pedestrian traffic. Exposed roots of trees line the embankment. This area lacked a shrub layer and groundcover, to hold soils and discourage pedestrians from trodding on sensitive areas.

The stabilization of Area 1 involved impact to approximately 232 linear feet (lf) of bank. This work included the placement of 40± lf of vegetated stone walls, 10± lf of unvegetated stone walls, 67± lf of spot stabilization with boulders and 83± lf of topsoil and mulch placement. The vegetated stone walls were planted with red-osier dogwood, American elderberry, and shining willow. These species were chosen because they root from live cuttings and for their significant wildlife habitat values. A catch

basin with sump and a leaching manhole were installed upstream of the bank at this site.

5.2 Area 2

Area 2 is located to the south of Area 1, on the northern side of the confluence of White Brook with Nashawannuck Pond. Pedestrian and bicycle access to this area is via a footpath extending from the end of the Brookside Cemetery access road. A gate discourages vehicular access to this site however, vehicles still drive down to the site. Area 2 also receives runoff from the cemetery access road. The soils covering the root systems of the trees had been eroded away by pedestrian traffic and the banks were severely eroded.

The stabilization of Area 2 involved the installation of a landscape timber stairway with a bark mulch path. The terraced plantings located on either side of the stairway were planted with mountain laurel, hemlock and highbush blueberry. Additionally, 18 lf of unvegetated stone walls and 35 lf of vegetated stone walls were installed to support the bank. Approximately 12 cubic yards of soil were removed from the end of the peninsula, restoring the Pond edge adjacent to the new stone walls. An existing footpath to the site was repaired and regraded to direct runoff to an existing low area. The surface of the path was repaired with wood bark mulch. The City intends to replace the gate with boulders to prevent motor vehicles from accessing this site.

5.3 Area 3

Area 3 is located on the southern side of the confluence of White Brook with the Pond. Area 3 is accessed via Nonotuck Park road and a path that leads to the site. Area 3 consists of a western stabilization area and an eastern stabilization area. The sites suffered from root systems exposed by erosion, exposed soils, and a lack of shrub vegetation and groundcover. A tree had fallen into the water because its root system could no longer hang on.

Stabilization activities at Area 3 - East included filling and regrading the path to the site to redirect runoff. Wood bark mulch was used for the surface of the path. Boulders were placed at the head of the path to prohibit vehicles from traveling on it. Vegetated stone walls (26 lf), unvegetated stone walls (40 lf) and spot stabilization with boulders (18 lf) were installed to stabilize the bank of the Pond. A timber slope check replaced 50 lf of eroded bank. Topsoil and mulch were added to 12 lf of bank. The recently downed tree was removed.

Area 3- West was stabilized with timber slope checks and terraced planting consisting of mountain laurel, hemlock and highbush blueberry and the construction of a timber stairway. A low berm of topsoil and bark mulch was installed to divert surface runoff to an existing low area.

5.4 Area 4

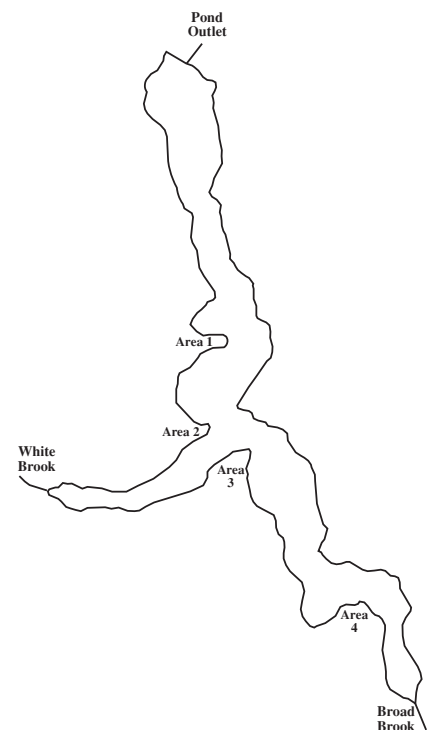
Area 4 is located to the north of the confluence of Broad Brook with the Pond and is accessed via a small footpath extending from the Nonotuck Park road. This site also suffered from exposed roots and eroded banks. Of all the sites, Area 4 maintained the most shrub vegetation and ground cover.

Four timber slope checks were installed to stabilize the slopes down to the Pond: three at the easternmost location and one at the western location. A small area at the bottom of the westernmost timber slope check was loamed and seeded with grasses. Topsoil and mulch was placed along 50 lf of bank.

5.5 Quality Assurance Project Plan

PVPC with the Nashawannuck Pond Restoration Project Advisory Committee, prepared a Quality Assurance Project Plan which identified the procedures and responsible parties for monitoring the results of the bank stabilization portion of the project.

The success of the bank stabilization project is to be measured in the establishment of the plantings. A vegetation survey form entitled Nashawannuck Pond Bank Stabilization Monitoring: Vegetation Planting Field Form was prepared to assist with monitoring the stabilization sites. The form contains a list of the species and number of plants installed during the stabilization work. The monitor identifies the number of plants present during the site visit and performs a qualitative assessment of the health, size and condition of the plants. Photographs of the sites are taken at the time they are monitored. A photographic survey and vegetative form were prepared for each stabilization site prior to construction and immediately after construction. (Field forms and photographs are included in Appendix D). Photographic surveys and field forms are scheduled to be prepared on an annual basis during the growing season in July 2001, 2002, and 2003.



Nashawannuck Pond Locus Map

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SECTION SIX: PROJECT RESULTS

6.1 Project Summary

This project addressed two issues identified within the 1988 D/F Study:

- 1) Promoting the concepts of “urban housekeeping” in the vicinity of the Pond through an educational program; and
- 2) Stabilize and rebuild four badly eroded “points” in the shoreline of the Pond and provide improved structures to control access by pedestrians and fishermen.

Promoting the concepts of “urban housekeeping”

The project addressed the first D/F issue through the demonstration projects by identifying sites that incorporated representative watershed-wide issues. The Best Management Practices identified for each of the three demonstration sites can be used in many different areas throughout the Nashawannuck Pond watershed and other sensitive areas. The Best Management Practices were incorporated into a poster-sized brochure along with some informative information about the Pond and its watershed. Best Management Practices described in the brochure addressed landscaping techniques, fertilizer and lawn care chemical usage, and management of stormwater runoff. The brochure was directed at the residents within the watershed and distributed in a community forum – the annual Fall Festival. The Nashawannuck Pond Steering Committee intends to distribute the remaining posters and other information pieces at upcoming events related to the Pond, such as fundraisers and the annual fishing derby at the Pond.

The project also included a workshop component targeting community officials. This workshop was a vehicle for dispensing information on the management and maintenance work that has occurred at the Pond, including the bank stabilization component of this project, other options for best management practices, and a case study of Pond watershed restoration in Springfield. This workshop brought together many municipal and institutional officials who manage large properties within the watershed. Attendees discussed their established best management practices and future goals.

Stabilize and rebuild four badly eroded “points” in the shoreline

The second D/F issue was addressed through the design and engineering, permitting, construction and post-construction monitoring of the four stabilization areas. Baystate Environmental Consultants, Inc. were hired to finalize the design of the stabilization sites, prepare a Notice of Intent filing under the Wetlands Protection Act,

prepare construction documents and conduct construction inspections. The project was permitted in September 1999, a contractor hired in the fall of 2000 and work completed in May of 2001. The stabilization work included bioengineering practices, such as vegetated stone walls, timber slope checks interspersed with shrub plantings and mulching, seeding and planting. The construction was completed as designed. The stabilization sites have been designed to direct pedestrians on less sensitive areas that are protected from erosion.

6.2 Project Evaluation

Education

The educational aspect of this project has been successful. Educational information directed at the watershed residents has been organized into an easy to read brochure. The Best Management Practices described in the brochure are relatively easy and cost-effective to implement. Community outreach at the Fall Festival and at future events is important to remind residents of their role in the watershed. The Nashawannuck Pond Steering Committee is committed to continued community education.

From the community officials’ workshop, a greater understanding was developed amongst the attendees. One goal of this workshop was to improve interrelationships amongst the various organizations by bringing individuals from the various groups together to discuss common issues and goals surrounding the Pond. A greater understanding of organizational roles and common practices was developed at the workshop. Coordination through future projects will tell if the interrelationships did improve.

Demonstration Sites

Three sites were studied for the demonstration aspect of this project. None of the sites were appropriate for incorporation of the designated best management practices due to ownership issues (with the two residential sites) and conflict with future proposed work (at the Town Beach site). Therefore, a site had to be chosen outside of the original three sites for the incorporation of a demonstration strategy. Williston Northampton School agreed to incorporate native wetland and upland plantings as a buffer and filter instead of the extension of grassed and fertilized areas at the edge of their athletic fields.

Bank Stabilization

The bank stabilization was completed as designed. The physical stabilization elements, such as the stone walls, timber check and rock barriers, are in place and working to

stabilize the sites. The planting and seeding was finished in May of 2001. The City will provide bark mulch for those areas that were not mulched by the contractor, using mulch to be created from the tree removal at Nonotuck Park. As the planting and seeding have recently occurred, it is too early to tell how successful the vegetative stabilization will be. However, some vandalism has occurred at the sites, primarily involving people pulling out branches from the vegetated stone walls. The City plans on installing signs requesting visitors to the Pond to respect the work that has been done. Volunteers will continue to monitor the stabilization sites and report on the establishment of the vegetation until 2003 as required in the Quality Assurance Project Plan. The City Engineer will be responsible for inspecting the stabilization sites in the future.

Quality Assurance Project Plan

A Quality Assurance Project Plan (QAPP) was developed to document the success of the bank stabilization. This documentation includes photographs and vegetation surveys of the four stabilization sites pre-construction, immediately after construction and for three growing seasons after construction. Photographic surveys and field forms have been completed for pre-construction and the immediate post-construction inspection. The visual documentation created by the photographs and the plant health and quantity tracked on the field forms will be used to assess the success of the stabilization work associated with this project. Volunteer monitors filled out vegetative survey forms to track the before and after conditions at each site. Volunteer monitoring will continue for three years after the construction is completed to track the progress and effectiveness of the plantings. The results of the post construction monitoring conducted after the termination of this \$319 grant (July 2001, July 2002 and July 2003) will be compiled into a report and submitted by the City of Easthampton to the Department of Environmental Protection as an addendum to this report.

Vegetation surveys (photographic and field sheets noting the absence, presence, and survival of the vegetation planted as part of the bank stabilization work) will demonstrate if revegetation efforts proposed to stabilize the bank and decrease erosion have been successful. Photographs of the sites have been taken prior to construction that illustrate the lack of vegetation. Volunteers will be able to compare photographs of the sites before and after construction, and will use the photographs in conjunction with the revegetation design plans and post-construction vegetation field sheets (which will note the presence or absence of vegetation and the specific quantities and species of vegetation planted at each of the four erosion areas) to determine if revegetation has succeeded.

It is possible that certain individual plants or plant species will not thrive under the conditions present at the sites. The City and Nashawannuck Pond Steering Committee will be able to make determinations about species success or failure based upon comparisons between the post-

construction documentation (photographic surveys and field forms) and the revegetation design plans. Every effort has been made by BEC, the design engineer, to identify species in the design plans that will tolerate the conditions that exist at the four erosion areas. Restoration is considered successful if 80% of the plants survive and are in good condition, based on visual assessment.

In the event that individual plants do not survive the first growing season, the contractor will be required to replace those plants. Based on the assessments, the City and Nashawannuck Pond Steering Committee can make a determination on the survival rate of certain species and determine if a particular species does not thrive in the bank conditions. The Nashawannuck Pond Steering Committee in conjunction with the City of Easthampton will undertake maintenance or repair of the stabilization sites.

6.3 Lessons Learned

Public and Government Support

The project benefited greatly from the support of the City government, the Nashawannuck Pond Steering Committee and the Nashawannuck Pond Restoration Project Advisory Committee. The Nashawannuck Pond Steering Committee was established in 1988 with the charge "to promote the clean-up and preservation of Nashawannuck Pond, and to recommend policies and direction to the Town of Easthampton concerning these issues." This committee had no funding source, therefore it sought funds through various grant programs such as the Massachusetts Clean Water Act funds (to develop a Diagnostic Feasibility Study); Frank Stanley Beverage foundation (to construct a gabion weir at White Brook); and Department of Environmental Management Lakes & Ponds Grant (to construct a sedimentation basin in Broad Brook). In addition to the grant sources used to pay for the above projects, the City of Easthampton contributed money. The Steering Committee also earned money through various fundraisers including bowl-a-thons, Save the Pond dances, sale of T-shirts and sweatshirts with the Pond's image and a photograph signing with a Teenage Mutant Ninja Turtle.

The tasks noted in this report were funded by a \$319 Competitive Grant, which is funded through the Environmental Protection Agency and administered through the Department of Environmental Protection, City of Easthampton funds, Natural Resources Conservation Services Wildlife Habitat Incentives Program funding, and a donation from the Florence Savings Bank. The City and the Steering Committee have been very successful in leveraging a variety of funding sources to implement projects.

Future projects are already planned for the Pond. The City has received funding through the \$319 grant program to install Vortech catch basins and deep sump catch basins. In addition to those funds, the City is seeking funding from the Executive Office of Environmental Affairs and the Army Corps of Engineers to perform a feasibility study to dredge the Pond.

The City government support and the support of the community, especially through the Steering Committee, has made the accomplishments associated with this project and past and future projects possible. The concerned citizens of the Steering Committee are a constant presence within the community, promoting the importance of protecting the Pond.

Demonstration Projects

Unfortunately, the demonstration projects that were designed by Conway School of Landscape and Design were unable to be implemented. A recommendation for future projects is to obtain the property owner's support not only for the design but also for the implementation of the demonstration BMPs.

User Education

Some vandalism has been identified at the stabilization sites after construction was completed. Specifically, one tree was disturbed and many branches within the vegetated stone walls have been removed. One group that should have been targeted for education is the users, primarily fishermen, of the stabilization sites. The City plans to install signs requesting that people respect the stabilization sites and give the vegetation time to establish.



Bank Stabilization at the Westerly side of Area 3.

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