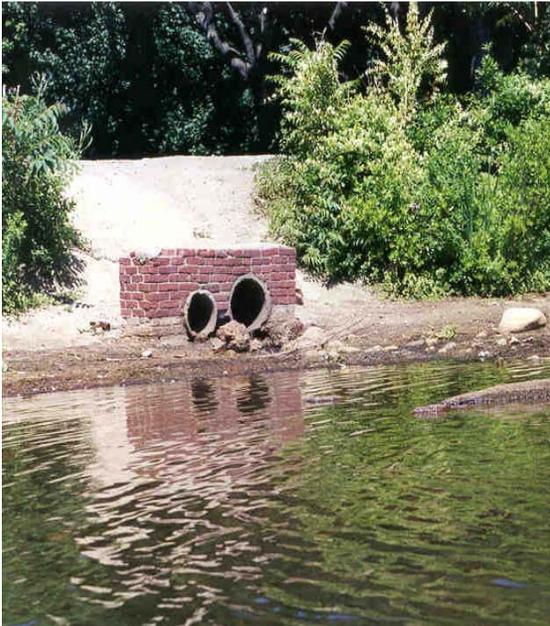


# Urban Watershed Management in the Mystic River Basin

Spy Pond, Arlington and Horn Pond, Woburn

July, 2002

## *Executive Summary*



Spy Pond, Arlington



Horn Pond, Woburn

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# Urban Watershed Management in the Mystic River Basin

## EXECUTIVE SUMMARY

### **1.0 Purpose and Goals of the Project**

Urbanization and the loss of perviousness within a watershed have major negative impacts on stream and lake systems. These impacts include the degradation of water quality, a decreased ability to sustain aquatic life, altered flow dynamics that increase peak runoff and suspended sediments and a decrease in groundwater discharge to streams and ponds.

These negative impacts can be minimized and mitigated through protection of stream and lake buffers, improved site planning, pollution prevention, and the use of both structural and non-structural Best Management Practices (BMPs) that remove or prevent pollutants and work to sustain the natural hydrodynamics of the sub-watershed.

This project focuses on two ponds in the Mystic River watershed, Spy Pond, a 102 -acre pond in Arlington, and Horn Pond, a 125 acre pond in Woburn. Spy Pond is an intensively used recreational pond within a densely populated urban area which is failing to meet its water quality criteria due to nutrients, organic enrichment/low dissolved oxygen and the presence of noxious aquatic plants. Horn Pond is also in a heavily urbanized watershed, which includes drinking water wells for the city of Woburn. This project's goal is to provide the watershed communities with the following:

- Assessments of stormwater impacts on Spy Pond and Horn Pond based on a detailed analysis of land cover within the watersheds; shoreline surveys and buffer zone characterization of Spy Pond's nine sub-watersheds; shoreline surveys and water quality monitoring for Horn Pond; the use of ortho-photographs and the CITY/green planning software for Spy Pond; used to calculate the benefits associated with trees' roles in reducing stormwater runoff, conserving energy, sequestering carbon, and removing air pollution; and analysis of urban runoff in one subwatershed of Horn Pond using the P8 computer model.
- Review of recommended stormwater remediation measures for Spy Pond;
- Reviews of current stormwater control measures in Arlington, Belmont, and Woburn;
- Recommendations for structural stormwater Best Management Practices by sub-watershed;
- Recommendations for nonstructural stormwater Best Management Practices such as land use regulations, DPW maintenance practices, and public education.

To accomplish this, MAPC worked with the Arlington and Belmont Planning Departments, Engineering and Conservation Departments, the Spy Pond Park Committee, the Arlington Vision 2020 Committee, of which the Spy Pond Park Committee is a subcommittee, Dr. John Durant of Tufts University, Pat Loheed, LA, and officials from the city of Woburn, including the City Engineer, Department of Public Works. Conservation Commission, and city planner.

## **2.0 Findings of the Assessments of Spy Pond and Horn Pond**

The major findings of this project are summarized below for Spy Pond and Horn Pond:

### **2.1 Spy Pond Assessment Findings**

- Water quality in Spy Pond does not support, or only partially supports, its designated uses. Nonpoint sources pollution, including runoff from developed areas and roadways, is considered to be a primary source of pollution.
- Spy Pond is a highly impacted resource that suffers from eutrophication, due in part to high inflows of phosphorous into the pond from stormwater runoff that is not being infiltrated back into watershed soils due to high levels of impervious cover.
- At this time, Spy Pond is categorized as being in advanced state of eutrophication, bordering on hypereutrophic.
- Stormwater runoff carrying high loads of sediment has deposited large sediment deltas near the inlets from the Route 2 outfalls.
- Dense development along sections of Spy Pond's shores, heavy recreational use and water level increases due to the installation of outlet flashboards have led to shoreline erosion around the pond.
- Sources of phosphorous to the pond may include animal waste and lawn fertilizers, both of which lead to turbid water conditions, poor odor, and large concentrations of algal scum on the surface of the pond. Excess phosphorous in Spy Pond's bottom sediments contributes to an over abundance of aquatic weeds and also elevates phosphorous levels within the pond's water column.
- Few practical sites exist within the Spy pond watershed to treat stormwater flows for phosphorus removal at this time.
- Some structural BMPs for the restoration of Spy Pond were approved in 2001 for Arlington.
- Analysis of municipal stormwater controls within the Spy Pond watershed indicate that watershed municipal controls can be improved to help the overall effort to restore Spy Pond.
- The use of the City/green software to model development scenarios within the Spy Pond watershed allows users to correlate loss of pervious cover types with quantified increases in stormwater runoff.

## 2.2 Horn Pond Assessment Findings

- Horn Pond serves two purposes for the City of Woburn. First, the pond is a heavily used recreational resource for the people of Woburn. Second, the pond lies within the wellhead protection area of the city's water supply wells.
- The Mystic River Basin is one of the most heavily urbanized basins in all of Massachusetts. Horn Pond, along with other waters of the Mystic Basin; suffer from the effects of urbanization and stormwater runoff.
- The land use in the Horn Pond watershed is predominantly urban, with 46 percent in residential use, and about 15 percent in commercial and industrial uses. Only 18 percent is forested, and 2 percent in wetlands. Such a land use pattern suggests a high percentage of impervious surface in the watershed, which is characteristic of significant urban stormwater impacts.
- It has been noted that withdrawals from the wells cause a decrease in the volume of surface water that flows through and out of the pond; thus average retention time in Horn Pond (volume of pond divided by annual outflow) is lengthy (about 250 days). Such a long retention time provides inadequate flushing and encourages eutrophication
- MAPC has been advised of severe algae problems in the pond and poor water quality in some of the five tributaries that flow into Horn Pond. Poor water quality has been particularly noticed at Town Meadow Brook.
- At the north end of the pond, along Sturgis Street and at the end of Beacon Street, there is a large stormwater outfall that discharges into the pond. This project has paid particular attention to this outfall and its associated storm drainage system as its contributing area drains much of Woburn's city center.
- In the 1991 report on the Woburn water system, CDM & MWRA concluded that urban runoff appeared to be impacting Horn Pond and the wells. The surcharging of an MWRA sewer trunk line during severe wet weather also impacts the pond.
- Dry weather flow was observed at the following tributaries to Horn Pond. Sucker Brook, which has two connections to the pond, Fowle Brook, Dow Brook, and the storm drain pipes at the Beacon Street Landing.
- Due to surrounding land uses the wet weather results exhibited high levels of TSS, fecal coliform, and PAHs in the more urban settings and lower in the more rural setting.
- The results from sample site #4 were high in fecal and TSS. This site was visibly dirty and smelled due to congregating birds.

### 3.0 Priority Recommendations for Restoration of Spy Pond and Horn Pond

The report contains a series of recommendations to the towns of Arlington and Belmont for the restoration of Spy Pond and to the city of Woburn for the restoration of Horn Pond. The recommendations include both structural Best Management Practices (BMP’s) as well as non-structural measures such as development regulations, maintenance practices, and public education. The recommendations are described in detail in Part 2, Spy Pond Assessment and Part 3, Horn Pond assessment. The highest priority recommendations for each pond are summarized in the tables below.

#### 3.1 Priority Recommendations for Spy Pond – Towns of Arlington and Belmont

The table below summarizes the priority structural and non-structural BMPs that should be considered by Arlington and Belmont as they move forward with the restoration of Spy Pond:

Structural BMPs	Non-structural BMPs
<ol style="list-style-type: none"> <li>1. <i>Arlington:</i> Install <b>leaching catch basin</b> at surveyed dry-flow <b>site 6D</b> as well as at other sites indicated on Map 2. 6D may be a good candidate for state administered Section 319 grant application.</li> <li>2. <i>Arlington:</i> Install <b>stormwater retrofits</b> for Sites <b>5A, 4C, and 8D</b>.</li> <li>3. <i>Arlington:</i> <b>Remove “flashboards”</b> at Spy Pond outlet structure.</li> <li>4. <i>Arlington:</i> Implement the following Spy Pond Park <b>anti-erosion measures</b>: <ul style="list-style-type: none"> <li>• <i>Re-vegetate shorelines,</i></li> <li>• <i>Provide distinct walking paths</i></li> <li>• <i>Install vegetated swale adjacent to Minuteman Bike Path</i></li> <li>• <i>Install boardwalk at Santini Field.</i></li> </ul> </li> <li>5. <i>Arlington/Belmont:</i> Work to combine state funding, business and community groups to raise funds and <b>accelerate the planned replacement of existing catch basins</b> with improved deep sump, leaching catch basins.</li> <li>6. <i>Arlington / Belmont:</i> Work with the MDC to come to a mutually beneficial agreement to <b>use the former MDC skating rink parcel as a stormwater treatment facility</b></li> </ol>	<ol style="list-style-type: none"> <li>1. <i>Arlington/Belmont:</i> To create awareness of and support for nonpoint remediation controls, <b>evaluate development processes</b> as outlined in Appendix Five, “Changing Development Rules in Your Community.”</li> <li>2. <i>Arlington/Belmont:</i> <b>Adopt stormwater/ erosion control bylaws</b> that would include redevelopment practices. Arlington should include residential stormwater BMPs in its bylaw for homes in Spy Pond watershed and consider tax rebates for impacted homeowners. See Appendix Six.</li> <li>3. <i>Arlington and Belmont:</i> <b>Adopt improved site plan review practices</b> for development within Spy Pond watershed. See Appendix 9</li> <li>4. <i>Arlington/Belmont:</i> Implement <b>increased catch basin cleaning and street sweeping schedules</b>. The towns could share the cost of purchasing a state of the art sweeper, about \$110,000.</li> <li>5. <i>Arlington:</i> Present <b>“Native Species Landscape Workshop”</b> for Spy Pond watershed residents.</li> <li>6. <i>Arlington:</i> Implement <b>Canadian Geese Controls</b>. See Appendix Eleven.</li> <li>7. <i>Arlington and Belmont:</i> Implement a more precise <b>road salting policy</b> with MHD in Route 2 road areas in SP watershed. <p style="margin-left: 40px;"><i>Arlington and Belmont:</i> Design and combine overall <b>watershed education programs</b> with NPDES Phase II Stormwater Plans. See Appendix Thirteen.</p> </li> </ol>

### 3.2 Priority Recommendations for Horn Pond – City of Woburn

#### Summary of Priority Recommendations to Restore Horn Pond

Structural BMPs	Non-structural BMPs
<ol style="list-style-type: none"> <li>1. Install <b>deep sump leaching catch basin</b> at shoreline survey <b>sites 36, 38, 39, &amp; 40</b>. Cost per leaching basin is about \$7,000. These sites should be good candidates for a DEP <i>Section 319 grant application</i>. See example in Appendix 1.</li> <li>2. Install <b>riprap</b> at outfalls of drainage pipes at sites <b>36,38,39, &amp; 40</b> as they discharge to pond. Riprap including labor and material costs should be in the range of a couple of hundred dollars per site. The benefit is dissipation of energies and less erosion. See examples on page 10</li> <li>3. Implement the use of <b>BMPs during construction and stock piling of construction materials</b> in close proximity to Horn Pond’s resources. (see pictures on page 8) <i>Implementation examples are: hay bales and silt fence, filter fabric under catch basin grates, specific dewatering plans directing drainage away from the pond and discharging to another BMP</i></li> <li>4. The Woburn DPW should install <b>BMPs to control runoff in the City’s DPW yard</b>. <ul style="list-style-type: none"> <li>• <i>Swales or vegetated berms in the vicinity of stored vehicles and scrap piles,</i></li> <li>• <i>Install paved surfaces with sediment collectors for areas of equipment cleaning,</i></li> </ul> </li> <li>5. Install a <b>buffer or berm</b> between stored private business vehicles adjacent to Horn Pond (northeast side), shoreline survey <b>sites 16,17&amp;18</b></li> <li>6. Implement the following <b>anti-erosion measures</b> around Horn Pond: <ul style="list-style-type: none"> <li>• <i>Re-vegetate shorelines in areas of heavy invasives,</i></li> <li>• <i>Install riprap under outfall drain pipes on Arlington Street side of pond</i></li> <li>• <i>Consider adding wooden log steps at various fishing access points to lessen the erosion due to foot traffic</i></li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>1. To create awareness of and support for non-point remediation controls, <b>evaluate development processes</b> as outlined in Appendix Five, “Changing Development Rules in Your Community.”</li> <li>2. Woburn should consider the costs and feasibility of <b>moving the MWRA trunk line</b> out of the immediate impact area of Horn Pond. <i>(For an example of impacts see picture on the front cover and pictures on page 26).</i></li> <li>3. <b>Adopt stormwater/ erosion control bylaws</b> that would include redevelopment practices. Woburn should include residential stormwater BMPs in its bylaw for homes in the Horn Pond watershed. <i>See Appendix Six.</i></li> <li>4. <b>Adopt improved site plan review practices</b> for development within Horn Pond watershed. <i>See Appendix 9</i></li> <li>5. Implement <b>increased catch basin cleaning and street sweeping schedules</b>. The town could consider sharing the cost of purchasing a state of the art street sweeper, about \$110,000.</li> <li>6. Present <b>“Native Species Landscape Workshop”</b> for Horn Pond watershed residents. <ul style="list-style-type: none"> <li>• <i>This type of project could be coordinated with the EOEA Wetlands Restoration Program</i></li> <li>• <i>The northeastern shore of Horn Pond is infested with Purple Loosestrife. The workshop should stress the hardiness of invasive plants and how quickly they can spread. Purple loosestrife can and is purchased at stores such as Home Depot!</i></li> </ul> </li> <li>7. Enforce the existing <b>pooper scooper law</b>.</li> <li>8. Adopt <b>Canadian Geese Controls</b>. <i>See Appendix 11.</i></li> <li>9. Consider implementing a more precise <b>road salting policy</b> in road areas in the entire Horn Pond watershed.</li> <li>10. Design and combine overall <b>watershed education programs</b> with NPDES Phase II Stormwater Plans. <i>See Appendix 13.</i></li> </ol>