

LAKE COCHITUATE NONPOINT SOURCE WATER QUALITY MANAGEMENT PLAN

TABLE OF CONTENTS

INTRODUCTION AND BACKGROUND	i
1.0 EXECUTIVE SUMMARY	1-1
1.1 Purpose and Goals of Project	1-1
1.2 Methodology	1-3
1.3 Findings of the Lake Cochituate Assessment	1-3
1.4 Recommendations for Nonpoint Sources of Pollution	1-4
1.4.1 Structural Best Management Practices	1-5
1.4.2 Non-Structural Best Management Practices	1-7
1.4.3 Recommendations for Bylaws and Regulations	1-8
2.0 OVERVIEW OF WATERSHED RESOURCES	2-1
2.1 Environmental Characteristics	2-1
2.1.1 Watershed Topography and Subbasins	2-1
2.1.2 Geology and Soils	2-2
2.1.3 Precipitation	2-3
2.1.4 Groundwater resources	2-3
2.1.5 History of Lake Cochituate Development	2-4
2.1.6 Wetlands and River Protection Buffers	2-4
2.1.7 Open space and recreational resources	2-5
2.2 Water Quality	2-7
2.2.1 Review of previous surveys	2-7
2.2.2 Water bodies on the Mass. Integrated List of Waters	2-11
2.2.3 Summary of Priority Water Quality Issues	2-12
3.0 LAND USE AND DEVELOPMENT TRENDS	3-1
3.1 Population and Development Trends	3-1
3.2 Existing land use	3-3
3.3 Projected land use at buildout	3-7
3.4 Impervious surface analysis	3-9
3.5 Infrastructure: water supply, wastewater, transportation	3-12
4.0 POTENTIAL SOURCES OF NONPOINT SOURCE POLLUTION	4-1
4.1 Underground Storage Tanks (USTs)	4-1
4.2 Hazardous Waste sites under Chapter 21E	4-4
4.3 Waste disposal: Junkyards and Landfills	4-9
4.4 Salt Storage and snow dumping areas	4-9
4.5 Septic system general areas	4-9
4.6 Golf courses	4-9
4.7 Roadway stream crossings with sediment	4-10
4.8 Inventory of Large Impervious Sites	4-10

5.0	WATERSHED ACTION PLAN FOR PRIORITY SUBBASINS	5-1
5.1	North Pond Subwatershed	5-2
5.1.1	Overview of Subwatershed land use	5-2
5.1.2	Identification of Priority Sites and Issues	5-4
5.1.3	Summary Watershed Action Plan	5-4
5.1.4	Priority Sites and Recommendations	5-6
5.2	Beaver Dam Brook Subwatershed	5-19
5.2.1	Overview of Subwatershed land use	5-19
5.2.2	Identification of Priority Sites and Issues	5-21
5.2.3	Summary Watershed Action Plan	5-22
5.2.4	Priority Sites and Recommendations	5-23
5.3	Pegan Brook Watershed	5-37
5.3.1	Overview of Subwatershed land use	5-37
5.3.2	Identification of Priority Sites and Issues	5-39
5.3.3	Summary Watershed Action Plan	5-39
5.3.4	Priority Sites and Recommendations	5-41
5.0	ASSESSMENT OF LOCAL WATER QUALITY PROTECTION MEASURES AND RECOMMENDATIONS	6.1
6.1	Assessment of Local Regulations	6-1
6.2	Stormwater Infrastructure and Roadway Maintenance	6-17
6.3	Other local practices	6-19
6.4	Codes and Ordinances Worksheet Summary	6-20
6.5	Recommended Protection Measures	6-22
6.5.1	Site Plan Review	6-22
6.5.2	Bylaws and Regulations	6-23
6.5.3	Maintenance and Operations	6-30
6.5.4	Summary of Adequacy of Bylaws/Regulations and Recommended Future Actions	6-32
7.0	CONCLUSION: WATERSHED ACTION PLAN	7-0
8.0	LIST OF REFERENCES	8-0

LIST OF MAPS

Note: Reduced copies of the maps (11"x14") are provided in the back cover pocket of this report. One set of the full size maps (30"x40") was provided to the Planning Department in each town.

- Map 1 Lake Cochituate Subwatersheds
- Map 2 Watershed Resources
- Map 3 Orthophotograph with Subbasins
- Map 4 Land Use
- Map 5 Imperviousness Analysis
- Map 6 Impervious Site Inventory
- Map 7 Potential Development Sites from Buildout Analysis
- Map 8 Potential Sources of Contamination
- Map 9 North Pond Subwatershed
- Map 10 North Pond Subwatershed Orthophotograph
- Map 11 Beaver Dam Brook Subwatershed
- Map 12 Beaver Dam Brook Subwatershed Orthophotograph
- Map 13 Pegan Brook Subwatershed
- Map 14 Pegan Brook Subwatershed Orthophotograph

LIST OF TABLES

- Table 1-1 Recommended Structural Best Management Practices
Table 1-2 Recommended Non-Structural Best Management Practices
Table 1-3 Recommended Bylaws and Recommendations
- Table 2-1 Lake Cochituate Subwatersheds
Table 2-2 Average Monthly Precipitation in the Northeast Region of Massachusetts
Table 2-3 Summary of Resource Areas in Lake Cochituate Watershed
Table 2-4 Open Space in Lake Cochituate Watershed
Table 2-5 Open Space Lands by Subwatershed
Table 2-6 Phosphorus Loading to Lake Cochituate, 1977 – 1979
Table 2-7 Total Nitrogen and Total Phosphorus Loads (lbs), 1978–1979
Table 2-8 Summary of Average Nutrient Concentrations (mg/l)
Table 2-9 Water Quality Sampling Results, August 16 & 17, 1994
Table 2-10 Waters Requiring a TMDL on the *Mass. Integrated List of Waters*
- Table 3-1 Population Trends, 1960-2000
Table 3-2 Population Projections, 2005-2025
Table 3-3 Percent Population Change, 1960-2000 and 2000-2025
Table 3-4 Summary of 1999 Land Use in Lake Cochituate Watershed
Table 3-5 Land Use by Subwatershed (1999)
Table 3-6 Buildout Potential by Subwatershed
Table 3-7 Zoning of Potentially Developable Land
Table 3-8 Zoning of Developable Lands By Subwatershed
Table 3-9 Land Use Imperviousness Coefficients
Table 3-10 Watershed Imperviousness by Subwatershed (Acres)
- Table 4-1 Summary of Underground Storage Tanks by Subbasin and Town
Table 4-2 Underground Storage Tank Inventory
Table 4-3 Summary of 21E Hazardous Waste Site in Lake Cochituate Watershed
Table 4-4 Hazardous Waste Site Inventory
Table 4-5 Recommended Priority 21 E Sites in Lake Cochituate Watershed
Table 4-6 Summary of Impervious Site Inventory
Table 4-7 Inventory of Large Impervious Sites
- Table 5-1 Summary of Priority Subwatersheds
Table 5-2 Land Use in the North Pond Subwatershed, 1999
Table 5-3 Summary of Priority Sites and Issues in North Pond Subwatershed
Table 5-4 Land Use in the Beaver Dam Brook Subwatershed, 1999
Table 5-5 Summary of Priority Sites and Issues in Beaver Dam Brook Subwatershed
Table 5-6 Land Use in the Pegan Brook Subwatershed, 1999
Table 5-7 Summary of Priority Sites and Issues in Pegan Brook Subwatershed
- Table 6-1 Checklist of Local Bylaws and Regulations
Table 6-2 Summary of Local Stormwater and Erosion Controls
Table 6-3 Stormwater Infrastructure and Maintenance
Table 6-4 Town De-Icing Programs
Table 6-5 Other Nonpoint Source Pollution Prevention Practices

LIST OF FIGURES

Figure 1-1 Map 1 - Lake Cochituate Subwatersheds

Figure 2-1 Lake Cochituate Subwatershed Areas (Acres)

Figure 2-2 Average Monthly Precipitation in the Northeast Region of Massachusetts

Figure 2-3 Open Space Lands by Subwatershed (Acres)

Figure 3-1 Population Trends, 1960-2000

Figure 3-2 Summary of 1999 Land Use in Lake Cochituate Watershed

Figure 3-3 Land Use by Subwatershed (1999)

Figure 3-4 Lake Cochituate Watershed Imperviousness

Figure 3-5 Watershed Imperviousness by Subwatershed (Acres)

Figure 4-1 Route 9 Stormwater Outfall to South Pond

Figure 4-2 Clogged Catch Basins, Route 9 at South Pond

Figure 4-3 Highway Drainage, Route 9 at South Pond

Figure 4-3 Highway Drainage, Route 9 at South Pond

Figure 4-4 Unstable Turnpike Embankment on Middle Pond

Figure 4-5 Drainage ditch at Natick Service Plaza

Figure 4-6 Clogged Drainage Outlet at Natick Service Plaza

Figure 4-7 Truck Stop in proximity to Catch Basin, Natick Service Plaza

Figure 4-8 Sediment laden snow pile in drainage ditch, Natick Service Plaza

Figure 4-9 Pictometry view of Natick Service Plaza

Figure 5-1 Land Use in the North Pond Subwatershed, 1999

Figure 5-2 Land Use in the Beaver Dam Brook Subwatershed, 1999

Figure 5-3 Land Use in the Pegan Brook Subwatershed, 1999

APPENDICES - PUBLISHED IN SEPARATE VOLUME

- 1) Model Stormwater Bylaws and Bylaw Adoption Guidance:
- 2) Sample Stormwater Bylaws and Ordinances:
- 3) DEP Stormwater Standards
- 4) Estimated Total Nitrogen and Total Phosphorus Loads, April 1978 – March 1979
- 5) Summaries of Stormwater Best Management Practices:
- 6) EPA Storm Water Technology Fact Sheets: Hydrodynamic Separators, Vegetated Swales, Bioretention, Catch Basin Cleaning,
- 7) Better Site Design practices
- 8) Leaching Catch Basin Diagram
- 9) “Stormwater Retrofits: Tools for Watershed Enhancement”
- 10) Landscaping and Lawn Maintenance Guidelines for water quality protection:
- 11) Street Sweeper, Catch Basin, Bridge and Roadway Maintenance Practices
- 12) Watershed Education and Program Development
- 13) Lake Cochituate Water Quality Advisory Committee
- 14) Massachusetts Integrated List of Waters—Category 5 Waters
- 15) Location of Snake Brook subbasins
- 16) Comment letter on draft report from Mass. Highway Department

To request a copy of the Appendices, please contact Martin Pillsbury at MAPC by e-mail at mpillsbury@mapc.org or by phone at 617-451-2770, ext. 2012