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## **VII. Fresh Pond Reservation Natural Resource Management Policy**

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### **A. Introduction**

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This Natural Resource Management Policy addresses the challenge of managing a complex ecosystem composed of wetlands, upland woods, steep hillsides, meadows, a variety of wildlife, irregular vegetated shorelines, and a variety of soil types and hydrological conditions. The policy incorporates general recommendations made in the *Fresh Pond Reservation Natural Resource Stewardship Plan* (February, 1999) prepared by Rizzo Associates, Inc., along with closely related natural resource management and monitoring priorities adopted by the Fresh Pond Master Plan Advisory Committee.

The Master Plan calls for the use of modern bioengineering techniques and identified desirable plant species, to protect Fresh Pond as the terminal drinking water reservoir for the City of Cambridge and, to preserve and enhance the educational and recreational values of the Reservation as an urban wild which all citizens can enjoy.

The Stewardship Plan presents general natural resource management recommendations, which are summarized in this section, and presents site-specific recommendations, which are summarized in Section VIII, immediately following. All recommendations are based on an analysis of baseline data collected in the field in the summer and fall of 1998 and documented in the *Fresh Pond Reservation Natural Resource Inventory* (Rizzo Associates, October 30, 1998). The recommendations also reflect a review of previous reports, previously collected data on the Reservation and multiple meetings with citizen groups and city officials.

The Stewardship Plan calls for stabilizing shorelines and upland slopes to address widespread problems with soil compaction and erosion (See B and C, below).

The Stewardship Plan calls for controlling invasive species of plants, encouraging desirable native species, increasing the diversity of species and improving the quality of soils. The Plan also calls for protecting specimen trees and groves, protecting unique vegetation, and protecting and enhancing wildlife habitat (See D, E and F, below).

The Stewardship Plan calls for physical improvements to paths, access points and the Perimeter Road, as described in G, below. The Master Plan adds a call for development and implementation of an ongoing natural resource monitoring plan, as described in H, below.

## ***B. Shoreline Management Policy***

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Unstable shorelines threaten significant degradation of the water supply and wildlife habitat, and can be eyesores and safety hazards. As noted in Section VI and in the Natural Resource Inventory, moderate to severe shoreline instability is found at Little Fresh Pond, Black's Nook and North Pond, caused by excessive human and dog intrusion which has resulted in soil compaction and erosion, preventing the development of appropriate stabilizing vegetation and leading to the undercutting of banks by wave action.

The Master Plan establishes the following priorities for shoreline management:

- Reconstruct or revegetate all eroded shorelines to help preserve water quality and to enhance habitat diversity and aesthetic values.
- Stabilize eroded shorelines of all water bodies through use of bioengineering techniques that emphasize vegetation and biodegradable materials instead of hard structures or conventional bank-armoring techniques (See Figure 14).
- Manage existing shoreline vegetation to discourage invasive species and encourage development of a dense and diverse understory.
- Reduce the impact of dog and human traffic on the shorelines of small water bodies by developing improved points of access to the water's edge where appropriate, and by directing all traffic to selected locations.
- Improve views of the Reservoir from the Perimeter Road by selectively thinning vegetation at a few carefully chosen sites.



*Figure 14: Fresh Pond Shoreline Stabilization by Vegetation, 1998 Source: Rizzo Associates, Inc., Summer 1998*

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### C. Upland Slope Management Policy

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Numerous upland slope areas exhibit moderate to severe soil erosion and compaction due to foot traffic and lack of a well-developed understory. The most severely eroded slopes are found in the forested areas of the Reservation, including the slopes of Kingsley Park, the north-facing Glacken Field slope, the gully at Fountain Avenue, the slope immediately below the golf course pro shop, and the south-facing slope of the Neville Manor site. Stormwater runoff erodes soil from these slopes, carrying it down to the Reservoir, causing siltation problems. Such erosion also exposes the roots of trees to trauma from foot traffic (See Figure 15).

The Master Plan establishes the following priorities for upland slope management:

- Redesign existing primary trails and redirect traffic away from the steepest, most vulnerable areas; revegetate secondary trails to direct foot traffic to primary paths.
- Develop switchbacks to replace existing direct downhill runs; incorporate drainage features such as periodic cross-path ditches; improve path surfaces with porous, protective materials.
- Rejuvenate eroded, compacted soils; protect slopes from erosive forces with natural techniques to capture silt and organic debris and discourage human and dog traffic.
- Address Fountain Avenue gully problems.
- Aggressively replant eroded and denuded slopes for long-term stability, using hardy, shade-tolerant, non-invasive groundcovers, shrubs and understory trees.
- Manage invasive species and dense tree canopies to allow penetration of sunlight and development of a healthy understory.

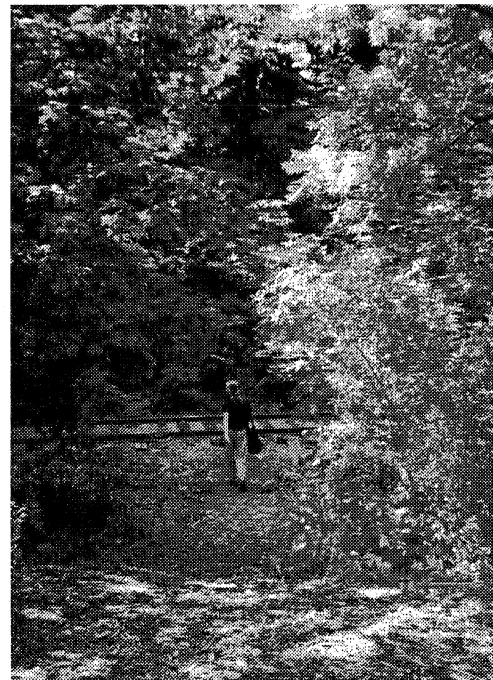


Figure 15: Soil Erosion on Steep Trail at Reservation Source: Rizzo Associates, Inc., Summer 1998

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## **D. General Vegetation Management Policy**

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This section includes a review of: (1) key vegetation management issues; (2) recommended plant species lists; and (3) general vegetation management priorities covering the forested areas, scrub/shrub areas and meadow areas of the Reservation.

### **1. Key Vegetation Management Issues**

Key interrelated issues for vegetation management policy were identified by the Fresh Pond Reservation Natural Resource Inventory as: 1) control of invasive plant species; and 2) encouragement of natural species diversity. Section 2.4.1 of the Stewardship Plan continues and extends the discussion of invasive species and species diversity.

Typical invasive terrestrial plant species are aggressive, fast-growing groundcovers, vines, shrubs and trees which may eventually drive out other species. They are strongly adaptable to disturbed, inhospitable soils of urban parks and areas subject to heavy usage.

Areas with desirable species diversity typically exhibit healthy, well-developed soils which absorb surface water run-off and filter silt and organic matter from run-off before it reaches streams, water bodies and water supplies. Diverse, well-developed vegetation layers nourish the soil and protect it from erosion.

### **2. Recommended Plant Species Lists**

The Stewardship Plan includes lists of desirable plants and trees suitable to different locations and different types of habitat in the Fresh Pond Reservation. The lists include the following:

- Wetland, Shoreline and Stream Bank Plant List
- Wet Meadow Plant List
- Dry Meadow Plant List
- Deciduous and Mixed Upland Plant List
- Evergreen Forest Plant List
- Barrier and Screening Plant List
- Golf Course Entry Plant List
- Perimeter Road and Trail Materials List

The recommended plant list should be revised and updated regularly by the Master Plan Advisory Board and by the Cambridge Water Department. Vegetation management policy for the Fresh Pond Reservation must be understood to require use of plants solely from the revised and updated lists or from lists of alternative plant species approved by the Water Department.

### **3. General Vegetation Management Priorities**

The Master Plan establishes the following priorities for vegetation management in forested areas, scrub/shrub areas, meadow areas and for areas of maintained lawn:

- Promote vegetation health, soil quality and water quality by controlling invasive species throughout the Reservation through best current and environmentally sensitive means, including specialized management approaches for individual species.
- Encourage a natural diversity of native plants in all areas of the Reservation, as appropriate for soil stability, health of ecosystems and visual enjoyment of the landscape. Restore and maintain grassy openings through periodic mowing, where appropriate.
- Improve the diversity of the meadow at Lusitania Field by removing escaped lawn grass and replacing with native grasses and wildflowers; promote educational and recreational use of the meadow by enhancing its wildlife habitat value; and manage the meadow through periodic mowing.
- Protect specimen trees and unique vegetation through best forestry management practices, including pruning, feeding, removal of vines and thinning of competing trees and vegetation to allow full development.

The Stewardship Plan also recommends rejuvenating and aerating degraded lawn and soils in Kingsley Park and Weir Meadow, and the reseeded and resodding of bare patches.

### **E. Management Policy for Wetlands and Small Water Bodies**

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Historically, the Fresh Pond Reservoir and what is now the Fresh Pond Reservation was part of huge tidal and freshwater wetland system, formerly known as the Great Swamp, which covered much of northwest Cambridge and surrounding towns and drained into the then-tidal Alewife Brook. Many of the historic marshes associated with Fresh Pond and the Great Swamp were located along the western and northern shorelines of the Pond. They have largely been lost, though North Pond on the golf course remains a relict example of a forested deep-water wetland, and Lusitania Field, until recent years, was a biologically rich wet meadow.

With the passage of the Hatch Act in 1974, the Commonwealth of Massachusetts recognized wetlands as highly valuable ecosystems deserving of special protection under law because of their important functions and values, which include filtering toxic substances out of stormwater run-off; storing floodwaters and preventing inundation of surrounding low-lying areas; preventing storm damage to shorelines by anchoring soils; and supporting the diversity of plants and animals upon which the stability of vital, complex ecosystems depends.

The emergent wetland to the north of Little Fresh Pond is very clearly delineated by vegetation visually quite different from the grasses surrounding it. At times, water stands in the center of the area. At other times of year, no water can be seen, but the plants continue to flourish. Shorebirds, ducks and sparrows frequent the area seasonally. When storms overwhelm the 72-inch drain-pipe that crosses the golf course and water spews from a relief valve nearby, the small wetland absorbs the water and protects the area around it, including the Reservoir.

A key priority of the Master Plan is to protect wetlands in the Reservation and to restore wetland functions to appropriate areas, especially on the golf course. Vegetated buffers are already being created on the golf course to protect wetlands without interfering with play. The Stewardship Plan recommends a comprehensive hydrological study of the golf course to serve as the basis for wetland enhancement, protection against flooding, and long-desired improvements to the design of the course and the field of play.

Three of the principal wetlands in the Reservation are associated with small but important water bodies, including Little Fresh Pond, North Pond and Black's Nook. The Inventory and the Stewardship Plan do not cover these minor water bodies. The Fresh Pond Master Plan Advisory Committee recommends that the Water Department and Recreation Division undertake a study of conditions in these small water bodies to determine what steps should be taken to maintain and enhance their water quality and the health of the ecosystems they support.

The Master Plan establishes the following priorities for management of wetlands and small water bodies:

- Maintain water quality in ponds and wetlands to at least the Class B standards set by the Commonwealth, referred to as the “fishable and swimmable” standards, so as to foster healthy aquatic and wetland habitat.
- Establish and maintain a diversity of native aquatic plants and wetland vegetation similar to that found in comparable healthy wetlands and around comparable ponds, both permanent and seasonal. Remove invasives where appropriate and replace with native, non-invasive plants.
- Protect existing wetlands, primarily through vegetative buffering, and also by educating Reservation staff and users.
- Identify, certify and protect any vernal pools that may exist at the Reservation.
- Enhance marginal wetland areas, where appropriate, to better serve key wetland functions such as filtering stormwater, controlling erosion and sedimentation, storing floodwaters and providing wildlife habitat.
- Monitor the health of wetland areas and minor water bodies regularly.

### **F. Wildlife Habitat Management Policy**

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The Reservation supports a limited number of obvious mammals, reptiles and amphibians, including eastern cottontail rabbit, muskrat, snapping turtle, painted turtle and bullfrog. A fox occasionally appears, as does an opossum, a skunk or a raccoon. But the Reservation doesn't offer much habitat appropriate for even moderate-sized mammals, and its shorelines are subjected to heavy stress, severely limiting opportunities for reptiles and amphibians. Only 33 percent of data plots sampled for the Inventory showed evidence of wildlife other than birds. Evidence of birds was found in 94 percent of the data plots.

Notable wildlife habitat areas at the Reservation include the wooded Glacken Slope below Glacken Field, the emergent wetland north of Little Fresh Pond, the North Pond area, the Old Field/Birch Grove adjacent to the 6th Fairway, the Black's Nook area, and the northern and western margins of Lusitania Field. In most of these areas, the number of bird species recorded in recent years has declined dramatically because of the spread of invasive plant species. These habitats should be rehabilitated and enhanced, first for the purpose of maintaining healthy ecosystems, and then to educate, entertain and raise the spirits.

The Fresh Pond Master Plan Advisory Committee established the following priorities for wildlife habitat management:

- Protect and enhance the quantity and quality of wildlife habitat, and encourage healthy populations of a diverse array of species consistent with maintaining the Class A water quality of the Reservoir.
- Conserve and promote diverse, native, non-invasive plant communities and ensure that plants with wildlife habitat value are given priority for planting in the Reservation.
- Protect and restore unique and rare habitat areas, such as scrub/shrub, seasonal isolated wetlands and meadow areas.
- Maximize overall wildlife habitat quality by encouraging the juxtaposition of different vegetative community types. Enhance overall value of woodland habitats by following appropriate forestry practices.
- Monitor status of wildlife populations on a regular basis.

### **G. Path, Access Point and Perimeter Road Management Policy**

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An extensive, unplanned and largely unmaintained network of trails traverses the Reservation, contributing to soil compaction, erosion, wildlife habitat disturbance and destruction of vegetated understory, all of which pose threats to water quality. The network of primary paths should be redesigned to minimize ecological disturbance while maximizing the aesthetic experience of walking through an urban wild. Edges of primary paths should be well defined with appropriate barrier vegetation. Traffic should be redirected from secondary trails to primary paths. Where appropriate, secondary trails should be revegetated.



*Figure 16: Soil Erosion and Compaction, Perimeter Road, 1998*  
*Source: Rizzo Associates, Inc., Summer 1998*

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The Fresh Pond Master Plan Advisory Committee calls for a pathway redesign study in its Public Facilities Management Policy (See Section XIII). Many trails lead into the Reservation from a set of access points, some planned but many unplanned. The question of how best to manage access for the protection of natural resources should be addressed as part of the trail redesign study.

Originally constructed for maintenance and public safety vehicles, the Perimeter Road has become an important recreational resource, which is increasingly heavily utilized. As a result, the paved surface has deteriorated and its shoulders have become compacted. Stormwater flows across the paved and hard-packed surfaces directly into the Reservoir without benefit of filtration or purification (See Figure 16).

The Stewardship Plan recommends construction of biofiltration swales along the road and on upland slopes. The Plan also recommends resurfacing all or part of the road using materials sufficiently porous to permit stormwater filtration by the road itself. A year-long test of such materials will be conducted in the near future by resurfacing the Perimeter Road from the Kingsley Park parking lot to the western edge of the Weir Meadow. The material to be used presents the appearance of a dirt road and is far friendlier to runners and joggers than asphalt. At the same time, the material meets standards for usage by persons with disabilities and can withstand usage by heavy vehicles.



**H. Natural Resource Monitoring Policy**

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The Fresh Pond Reservation is a natural area in an urban setting which should be managed first as water supply land and second as a recreational and educational resource. Therefore, key environmental indicators should be monitored systematically so that decision-makers can protect the Reservation as a natural resource and can also ensure that visitors use the land appropriately.

The Fresh Pond Reservation Natural Resource Inventory and Natural Resource Stewardship Plan describe existing conditions in the Reservation and provide a scientific model for regular collection of data.

Environmentally healthy areas of the Reservation should be monitored along with degraded areas. Signs of positive as well as negative change should be identified and documented, along with signs that conditions have not changed. Areas under regular maintenance should be monitored along with areas that are not. Special attention should be given to wetlands and other environmentally sensitive areas.

Recreation Division and Water Department staff should prepare checklists and schedules, taking growing cycles and other seasonal factors into account, and permitting them to identify needs for routine maintenance and to evaluate regularly scheduled maintenance. These monitoring schedules should call for periodic briefings to give decision-makers early notice both of seriously deteriorating conditions and of significant new opportunities to improve the environmental well-being of the Reservation. In this way, needs for funding or other resources can be anticipated.

To ensure adequate coverage of the Reservation, city staff should actively recruit volunteers to conduct monitoring whenever and wherever appropriate, including members of the Cambridge Conservation Commission, the Committee on Public Planting, the Cambridge School Department and the Fresh Pond Master Plan Advisory Board.

City staff should prepare an annual Environmental Monitoring Report for the Recreation Division, the Water Department and the Advisory Board.

All departmental plans for landscape improvement and environmental remediation within the Reservation should include provisions for environmental monitoring and for identifying and meeting needs for maintenance. Requests for proposals should include a requirement that consultants and contractors provide for adequate monitoring.

