



Vegetation Management Plan
Chestnut Hill Reservation
Boston, Massachusetts



March 2007

Massachusetts Department of Conservation and Recreation
Division of Planning and Engineering
Resource Management Planning Program



VEGETATION MANAGEMENT PLAN Chestnut Hill Reservation

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Introduction

The existing vegetation is a major resource within the Chestnut Hill Reservation and is a major contributor to the site's natural and aesthetic beauty. Upon closer inspection of Reservation's existing vegetation, there are several issues that need addressing to ensure the continued beauty of the Reservation. Invasive plants that threaten the historic plants and views flourish throughout the site, dead trees and branches endanger the public, and new plantings and lawn renovation are needed in many areas.

The Chestnut Hill Reservation Vegetation Management Plan (VMP) is intended to serve as a guide for the Department of Conservation and Recreation (DCR) in its maintenance and enhancement of the site's vegetation and protecting the site's historic resources. Management and maintenance of vegetation should be a component of overall management of the Reservation. As such, the VMP is an extension of the Chestnut Hill Reservation Resource Management Plan (RMP) adopted by the DCR in November 2006. While the RMP establishes a set of recommendations and management criteria for the Reservation as a whole, the VMP focuses exclusively on vegetation management. The VMP is intended to be flexible and the recommendations presented should take into consideration the current DCR maintenance resources available for the site. The VMP is to work in strong coordination with the goals, recommendations, and implementation strategy of the RMP.

Implementation of the VMP will be through a combination of existing staff, increased staffing (when available), and the use of landscape contractors under current DCR maintenance contracts. It is recommended that the DCR have maintenance staff with a basic level of horticultural training. Continuing education in horticulture for existing staff is also recommended.

In order to serve as a management tool for the DCR, the VMP divides the site into ten Management Areas. In addition to overall vegetation management guidelines for the entire Reservation, there are a series of specific management recommendations and projects for each of the Management Areas. It is intended for the guidelines and management recommendations to work together to form a strategy for the desired landscape effect and character for each of the Management Areas and the Reservation as a whole. The accompanying illustrative plan ("Management Plan") graphically shows this strategic vision for the future landscape. This plan illustrates the locations for vista clearing, tree pruning, renovated grass areas, new plantings, and other recommended actions and management concerns. As invasive plants are a major problem in the Reservation, an appendix section detailing invasive plant identification and control is included. The VMP also contains a specific planting plan for the Chestnut Hill Driveway Overlook where overly aggressive vista management has denuded the slope and allowed volunteer and invasive plant growth. The planting plan is designed to stabilize the slope, blend the vista area with surrounding woodland, and establish plants that are compatible with the maintenance of the vista.

The VMP is divided into three chapters with the Management Plans and Overlook Planting Plan included in the Appendices. Chapter 1 gives a brief description of the existing site and historic landscape. Chapter 2 is the main section of the VMP as it organizes vegetation management priorities and describes the existing vegetation conditions, establishes the desired vegetative character, and then sets up specific vegetation recommendations for each of the Management Areas. Chapter 3 describes the general landscape maintenance tasks and guidelines concentrating on lawns, planting areas, and tree and woodland management throughout the Reservation.

It should be noted that this document contains amended excerpts from the RMP. Although the VMP is intended to work in cooperation with the RMP, the VMP should also stand as an independent document and as a sourcebook for both overall site planning and the Reservation maintenance staff. Information in the VMP will also guide staff and volunteer efforts so that such work will provide long-range and positive results.

Goals

The goals of the Chestnut Hill Reservation Vegetation Management Plan are:

- **To build upon the vegetation recommendations of the Chestnut Hill Reservation Resource Management Plan and enhance the historic landscape.**
- **To provide guidelines for basic horticultural practices to ensure consistency between DCR staff and volunteer work.**
- **To identify priorities for maintenance and landscape management, which are adaptable to changing budget and staffing levels.**
- **To remove hazardous trees and branches for public safety.**
- **To provide regular and appropriate care for existing vegetation.**
- **To provide recommended locations and species for new trees, shrubs, groundcovers, and lawn.**
- **To implement a program for the control of invasive and undesirable plants.**

DCR looks forward to implementing the recommendations of the VMP through its current practices of arboriculture, vegetation control, and integrated pest management. Specifically, the vegetation management practices will follow the procedures outlined in the DCR Division of Urban Parks *Five Year Vegetation Management Plan (2006-2010)* which has been filed with the Boston Conservation Commission. Implementation will also follow the standards and guidelines of the Boston Landmarks Commission, and the regulations of the Massachusetts Historical Commission.

Like the RMP, the VMP is also meant to guide the activities of DCR's park partners. Park staff will use the VMP to identify projects for volunteers, and to prioritize and plan work from season to season. It is hoped that the VMP will be the framework for public/private cooperation in maintaining the historic landscape of Chestnut Hill Reservation.

Chapter 1

Site Description and Historic Landscape

Reservation Site Description

Located within Brighton, Massachusetts in the City of Boston, the Chestnut Hill Reservation is a 133.28-acre parcel and consists of the large reservoir (Bradlee Basin), an earthen dam, natural wooded areas, open lawn area, pedestrian paths, two reservoir gatehouses, the Reilly Memorial Pool and Rink, and two roadways, Chestnut Hill Driveway and Saint Thomas More Road. In addition to the wooded areas, ornamental trees and plantings line Chestnut Hill Driveway and Saint Thomas More Road and front the Rink building. The Reservation is currently managed by the DCR (formally the Metropolitan District Commission) under an agreement with the Metropolitan Water Resources Authority (MWRA) and a lease from the City of Boston.

The 133.28 acres includes the 85-acre Chestnut Hill Reservoir, the 4.5-acre Shaft #7 (officially managed by the MWRA), and two parcels immediately adjacent to Shaft #7 (total of 1.4 acres) which are licensed from the Commonwealth to Boston College. The landscape areas on the entire west side of Saint Thomas More Road and the landscape areas east of Saint Thomas More Road and north of the Evergreen Cemetery entrance area are typically maintained by Boston College, but is mostly just mowing of lawn areas. Shaft #7 is not part of this VMP. The total area of the Reservation covered by the VMP is approximately 46.5 acres.



Figure 1.1: View of the northern side of the Chestnut Hill Reservation

Historic Landscape

The park-like landscape of most of the land now known as the Chestnut Hill Reservation was laid out between 1866 and 1870, at the same time as the Reservoir and roadway were being constructed. There are no known historic planting plans or plant species lists, but it is possible to identify the character of the planting and some individual species from historic photographs, postcards, written descriptions, and the records of the Boston Water Board. It is clear that a number of groves of trees were on the site prior to the construction of the Reservoir and that many of these were retained and incorporated into the new park. The Water Board then added specimen shade trees, flowering shrubs and vines, as well as laying out some areas as grass.



Figure 1.2: January 25, 1901, Chestnut Hill Reservoir (Bradlee Basin) Dam and Pumping Stations

Originally, much of the unwooded landscape was covered with grass, which from historic photographs was meticulously mown to give a neat, manicured appearance. These lawn areas included the dam or embankment that retained the Bradlee Basin to its south and east; six foot wide strips bordering the path that encircled both basins; the land bordering Beacon Street as it approached the Reservoir and the entry drive that led to Gatehouse #1; and various larger open areas, particularly around the former Lawrence Basin.



Figure 1.3: June 23, 1912, Shore at Chestnut Hill Reservoir (Bradlee Basin)

The area to the east of the Reservoir, around the hill parcel, was wooded, with a mix of evergreen and deciduous trees growing naturalistically in grass. Close to the water's edge, the large bedrock outcropping was planted with deciduous trees and vines, including Porcelain Berry and Virginia Creeper. In the northeast corner of the Reservoir, near the junction of the Driveway and Chestnut Hill Avenue (later Commonwealth Avenue), were a number of smaller rock outcroppings planted with deciduous, probably flowering, shrubs, columnar trees (probably Eastern Red Cedar) and grass. To the north of the Bradlee Basin the hilly promontory was densely

covered with a range of mature trees. From their size in early images of the Reservoir, many of the trees must pre-date the creation of the park. They appear to have included oaks, elms and clumps of birch trees as well as a number of evergreen species. There were also some large specimen trees to the north of the Driveway in this area, perhaps including a very large American Elm. A further wooded area was located on the triangular piece of land that jutted into the former Lawrence Basin (now known as Shaft #7). Over the dam separating the current Bradlee Basin and the former Lawrence Basin, the plantings were smaller in scale, with low massing of flowering deciduous and evergreen shrubs planted in grass. This area is now Shaft #7. Similar plantings edged the path that joined the Driveway and the Intermediate Gatehouse. A large specimen deciduous tree marked the curve of the Driveway as it met Beacon Street.

Centennial Elms were planted in 1876 around the Reservoir and along the Chestnut Hill Driveway. Also in 1876 and again in 1887, elms were planted on both sides of Beacon Street. (The records of the Water Board and correspondence from renowned landscape architect Arthur Shurcliff both described them as English Elms, although that would seem a surprising choice to mark the centennial.) Although they appear to have thrived at first, by the 1920s many were in poor condition and more were destroyed by the 1938 hurricane. None survive today.



Figure 1.4: August 11, 1930 Aerial Photograph of Bradlee and Lawrence Basins

The 1977 Metropolitan District Commission (precursor to the DCR) improvements included an extensive program of replanting throughout the Reservation in conjunction with many other major improvements to the paths, Chestnut Hill Driveway, and other site features. Some shade trees were added to new landscaped areas at the Chestnut Hill Driveway and Saint Thomas More Road intersection, and a new circular bed was planted with small ornamental trees in front of Gatehouse #1. But, based upon the inventory of the existing site conditions, and an analysis of the photographs taken of the 1977 work, it seems that many of the proposed planting plans were never implemented or have not survived.

Portions of the current Reservation were nominated as a City of Boston Landmark in 1989 and the Reservoir and many of its associated structures were listed on the National Register of Historic Places as part of the larger Water Supply of Metropolitan Boston thematic nomination in 1990. The natural landscape was an important consideration in the nomination of these historic designations.

Existing Landscape

Today, as in the historical landscape, the vegetation is composed of a mix of open grass areas, wooded areas, and areas of shade trees over grass. Large oak and beech trees and some Eastern Red Cedars and Eastern White Pines in the wooded areas of the Reservation are remnants of the historic landscape. But many of the open areas under trees that allowed views to the reservoir have been lost due to understory and invasive plant growth. In addition, there is a mixed grouping of successional shrubs, saplings, and invasive plants within the rip-rap lining the reservoir further disrupting views, although these plants are cut back on an annual basis since DCR retained control of the Reservation. Densely wooded areas are found on the slope north of the Reservoir, the area between Chestnut Hill Driveway and Evergreen Cemetery, and on the hill parcel in the northeast corner of the Reservation. A number of exposed rock ledges are visible along the eastern and northern side of the reservoir. These rock ledges were prominently seen in historic photographs but have become partially obscured by encroaching vegetation. There are areas of trees over mown grass between Chestnut Hill Driveway and the Commonwealth Avenue apartment buildings, the intersection of Chestnut Hill Driveway and Saint Thomas More Road, and the area between the Pool and Rink and the reservoir. The areas along Saint Thomas More Road adjacent to Evergreen Cemetery and Boston College are typically composed of street trees over a narrow strip of mown grass. Several trees are fairly large. The most common large trees tend to be oak species, typical of most upland areas in this part of eastern Massachusetts. Whereas many of the large trees tend to be in fair to good condition, some are in poor and hazardous condition and require major pruning or complete removal as they present a threat to visitor safety and show a visible lack of maintenance to the public. Many of the heavily wooded areas are dense with understory vegetation, both shrubs and tree saplings. But some open understory areas also exist. Other areas, particularly the slopes of the dam and the area immediately around the Reilly Pool and Rink are open mown lawns.

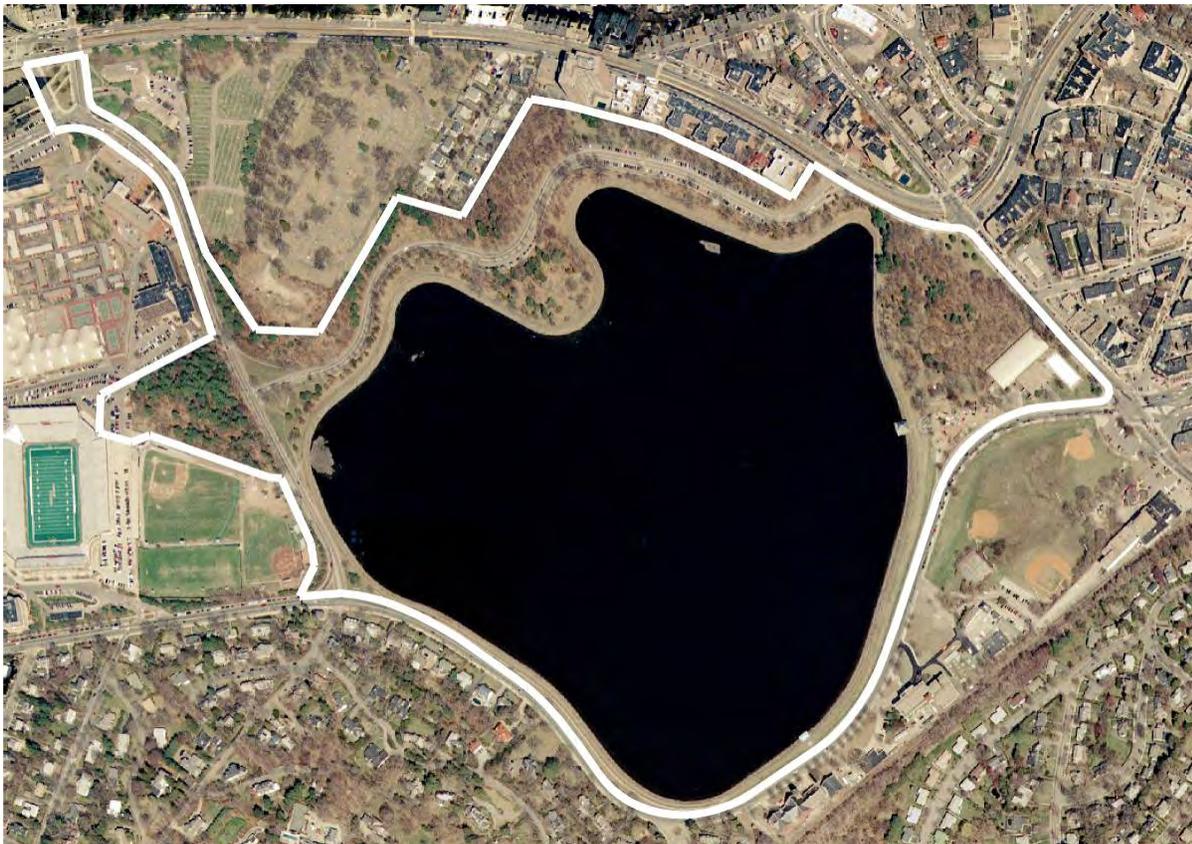


Figure 1.5: Aerial Photograph of Existing Reservation, MassGIS 2005

A range of invasive plant species exist in all areas of the Reservation and have managed to crowd out much of the desirable plants and block views. Poison Ivy, a species native to New England, is also a persistent problem throughout the Reservation. Members of the public have expressed particular concern for the Poison Ivy and one of the invasive tree species, Tree of Heaven.

In Spring 2006, a complete inventory and analysis of the Heritage Trees (a term for trees greater than 32" in caliper) on the site was undertaken and was provided as part of the RMP. The inventory noted the location, size, species, and condition of each of the Heritage Trees, which are mostly located in the wooded areas north and east of the Reservoir. The inventory also noted other trees on the site which, although smaller than 32" caliper in size, merit horticultural attention, either because they approach the size of Heritage Trees or represent a unique specimen tree with a strong form and size for the particular species. In addition, the inventory noted the location and approximate size of dead and hazardous trees. As of Spring 2006, there were a total of 77 Heritage Trees, 65 other significant trees, and 10 large dead trees. The typical Heritage Trees species were Northern Red Oak, White Oak, Black Oak, American Basswood, European Beech, and Eastern White Pine. Other trees considered horticulturally significant included the previously mentioned species as well as Norway Spruce, Green Ash, and Larch (European or Japanese).

Chapter 2

Vegetation Management

This chapter contains specific vegetation management and maintenance recommendations for each of the Management Areas in the Reservation. In coordination with this chapter, the illustrative Management Plan in Appendix A shows the specific areas for these recommendations including suggested locations for new plantings, vista clearing, invasive plant control, and selective tree pruning.

Vegetation Management Priorities

Based upon an evaluation of the existing site conditions at the Reservation and concerns of the DCR and the public, the Vegetation Management Plan recommends five priority items for the Reservation. These priorities will need to be compatible with available DCR resources.

Priority 1. Hazardous and Dead Tree Removals

The large caliper tree survey that was conducted in 2006 as part of the RMP revealed a number of unsafe trees in the Reservation. These include several dead trees close to pedestrian areas as well as otherwise healthy trees with dead or diseased branches immediately over pathways. Due to concerns for public safety and liability, the DCR should immediately implement a hazard reduction pruning program to remove dead trees and dangerous branches throughout the Reservation. The DCR should concentrate this effort first in pedestrian and vehicular areas.

Priority 2. Vista Management

Several historically significant vistas throughout the Reservation have been lost primarily to overgrowth of vegetation. Opening of these vistas can be accomplished through a combination of selective pruning, some plant removal, and careful selection of new and appropriate plant species. The Chestnut Hill Driveway overlook is a recently reclaimed vista which requires a new planting plan to remove the undesirable and invasive vegetation, stabilize the slope, screen the cars on Chestnut Hill Driveway, and blend new plants in with the surrounding landscape all while maintaining the re-established view to the reservoir and areas south of the Reservation.

Priority 3. Lawn Renovation within the RMP Historic Restoration Area

The RMP sets up the area along the reservoir dam as an area for historic restoration (Management Areas C and D). Based on historic photographs, this area was well maintained and the lawn meticulously manicured. The existing lawn areas on the dam, being mostly composed of grass species, weedy, herbaceous material, and some woody plants, do not reflect the historic conditions at the time of the 1901 restoration period. A lawn renovation process will bring back this area to its historic appearance.

Priority 4. Invasive and Undesirable Plant Management

While invasive plants are a problem throughout the reservation, certain invasive plants and some areas of the Reservation are more problematic than others. Tree of Heaven occurs in some isolated areas but may threaten to spread elsewhere. Control and removal of this plant should continue but with the proper control measures whether from DCR staff, contractors, or volunteer groups. Poison Ivy, although a native plant, is a problem widespread throughout the Reservation and should primarily be controlled and removed adjacent to pedestrian areas. Ideally other species of invasive plants should be controlled and removed, but complete removal may not be possible with current or future DCR resources. In these cases, the invasive plants populations should be monitored and control measures implemented to maintain the plants at tolerable levels.

Priority 5. Management of Buffer and Woodland Areas

The existing vegetated buffer and woodland areas serve important functions within the Reservation by separating and protecting the “urban oasis” of the Reservation from the surrounding urban environment and other land uses. These areas include the woodland along the northern edge of the Reservation, the wooded slopes on the north and east sides of the reservoir, and the vegetated edge along Beacon Street. These buffers should be both managed and enhanced to ensure continued viability into the future. Management includes selective pruning, invasive plant removal, new plantings to replace dead vegetation, and encouraging natural self-regeneration cycles. A section of woodland management is included in Chapter 3.

Landscape Maintenance Levels

In order to guide the management of vegetation in the Reservation, a hierarchy of maintenance levels for both turf and planted areas is described below. Each area within the Reservation should have its own turf and planted area maintenance level based on its intended character and use.

Turf Maintenance Levels

Turf is the technical name for all areas where grass is grown as the prominent ground cover vegetation. Turf areas, also referred to as lawn, can be managed under different levels based upon their function, use, location, and desired appearance. The following are the common levels of turf maintenance for public parks and are recommended for the Reservation.

1) Turf Level 1: Mowed to height of three inches every 5-7 working days. Annually, the turf is evaluated for renovation, aeration, overseeding, disease, and fertilizer treatment. Soil tests in selected areas are performed annually and mineral soil amendments (Limestone, potassium fertilizer, etc.) should be applied if necessary in accordance with soil testing results. Before lime applications are made, the soil should be aerated. Nitrogen application of 1 lb./1000 square feet should be made as necessary in the spring (late April). Phosphorous fertilizers should not be applied where they can enter into water surfaces. Phosphorous-containing fertilizers contribute to eutrication of water and the growth of aquatic weeds. Turf renovation (overseeding) is carried out during the months of late August through September if necessary. When turf is renovated, a snow fence is erected to protect the grass.

2) Turf Level 2: Mowed to height of four inches every 7-12 working days. The soil is tested and lawn areas are fertilized as required by testing results. Some weeds and bare spots are acceptable but routinely corrected.

3) Turf Level 3: Mowed to height of four and one-half inches every 14-18 working days. This turf requires no fertilizer, no irrigation, occasional repair, some weeds are tolerated, and it can be allowed to wear out and grow through rest cycles.

The Turf Level 1 is recommended for the RMP Restoration Zone. Most other turf areas in the Reservation will typically fall under Turf Level 2. Turf Level 3 is only recommended for grass areas along paths in the woodland areas.

Planted Area Maintenance Levels

Planted areas include all areas intentionally planted with non-turf groundcovers, shrubs, and trees to serve an ornamental or natural vegetated purpose. The annual maintenance program for existing planted areas depends on the type and function of plant material, location of the planted area in the Reservation, and the skill levels of the personnel responsible for the work.

1) Planted Areas Level 1: Less than 10% weeds and 5% deadwood. They will have a manicured appearance reflecting the nature of the space. The shrub species will be kept pruned on a regular basis, deadwood will be removed, and in general the maintenance will be of a high level. Shrub beds and small trees are edged and mulched each spring. Shrub beds are maintained and weeded monthly and invasive species will be removed monthly. Shrub beds and trees are watered as required.

2) Planted Area Level 2: Less than 10% weeds and 10% deadwood. This includes shrub beds with plants that have a more bushy irregular appearance in keeping with their surroundings and a much lower level of maintenance. These shrubs look reasonable if kept untrimmed. Shrub beds and small trees are edged and mulched each spring. Shrub beds are maintained and weeded and invasive species removed in late spring and early fall. Shrub beds and trees are watered as required.

3) Planted Area Level 3: Less than 10% invasive species. These are naturalistic areas that serve to provide an understory, a visual screen, or buffer between intensively used areas and wildlife habitat. Use is typically low level and informal. The shrubs are allowed to achieve their natural form. The shrubs will rarely be pruned and species will be chosen that will flourish in the particular site and light conditions and will grow to the desired height without any pruning or shaping. Invasive species will be monitored and removed two times per year.

Planted Area Level 1 is recommended for primarily for areas around the Reilly Pool and Rink and any future plantings in the Gatehouse #1 courtyard. Planted Area Level 2 would include shrub beds in the area of the proposed pedestrian gateways. Planted Area Level 3 areas typically abut or are within natural woodland areas.

RMP Maintenance Zones

In the Operation Plan section of the RMP, seven maintenance zones were established based upon general vegetation type or relationship to a particular part of the Reservation or maintenance responsibility. Five of these zones are currently maintained by DCR and two are currently maintained by others.

Maintenance zones currently maintained by DCR:

- Zone 1** Mown Lawn
- Zone 2** Trees over grass
- Zone 3** Woodland
- Zone 4** Reilly Memorial Pool and Rink
- Zone 5** Edge of water (Rip rap)

Maintenance zones currently maintained by others:

- Zone 6** Saint Thomas More Road edge at Boston College/Evergreen Cemetery (mostly lawn maintenance)
- Zone 7** Chestnut Hill Reservoir Community Gardens

Vegetation Management Areas

The VMP advances this idea by dividing the site into ten Management Areas based upon physical and vegetative characteristics and relationships. The Management Areas, as opposed to the RMP maintenance zones, are continuous areas and have definite boundaries. Each Management Area can contain one or more of the RMP maintenance zones. The purposes of the Management Areas are to guide in the DCR's management approach to the site and to create a landscape vision for each that fits in with the whole of the Reservation. Each Management Area will have their individual vegetation management recommendations and maintenance requirements. The Management Area system also allows for a systematic way of rehabilitating and restoring the different parts of the site in an organized fashion. As resources allow, recommended vegetation projects can be handled one or two Management Areas at a time. If feasible within future Reservation staffing, Management Areas can be assigned their own staff member responsible for the Management Area's specific maintenance needs.

The proposed ten Management Areas (with approximate acreage) are:

- Management Area A:** Northeast wooded hilltop (7.1 acres)
- Management Area B:** Reilly Memorial Pool and Rink (2.2 acres)
- Management Area C:** RMP Historic Restoration Management Area and associated landscape (3.4 acres)
- Management Area D:** Reservoir shoreline (6.2 acres)
- Management Area E:** Southwest corner (1.8 acres)
- Management Area F:** Intersection of Saint Thomas More Road and Chestnut Hill Driveway (1.7 acres)
- Management Area G:** Wooded slope north of Reservoir (8.6 acres)
- Management Area H:** North wooded Management Area (7.9 acres)
- Management Area I:** Wood and grass area by Chestnut Hill Driveway parking area (3.3 acres)
- Management Area J:** Saint Thomas More Road (4.3 acres)



Figure 2.1: Resource Management Plan Maintenance Zones

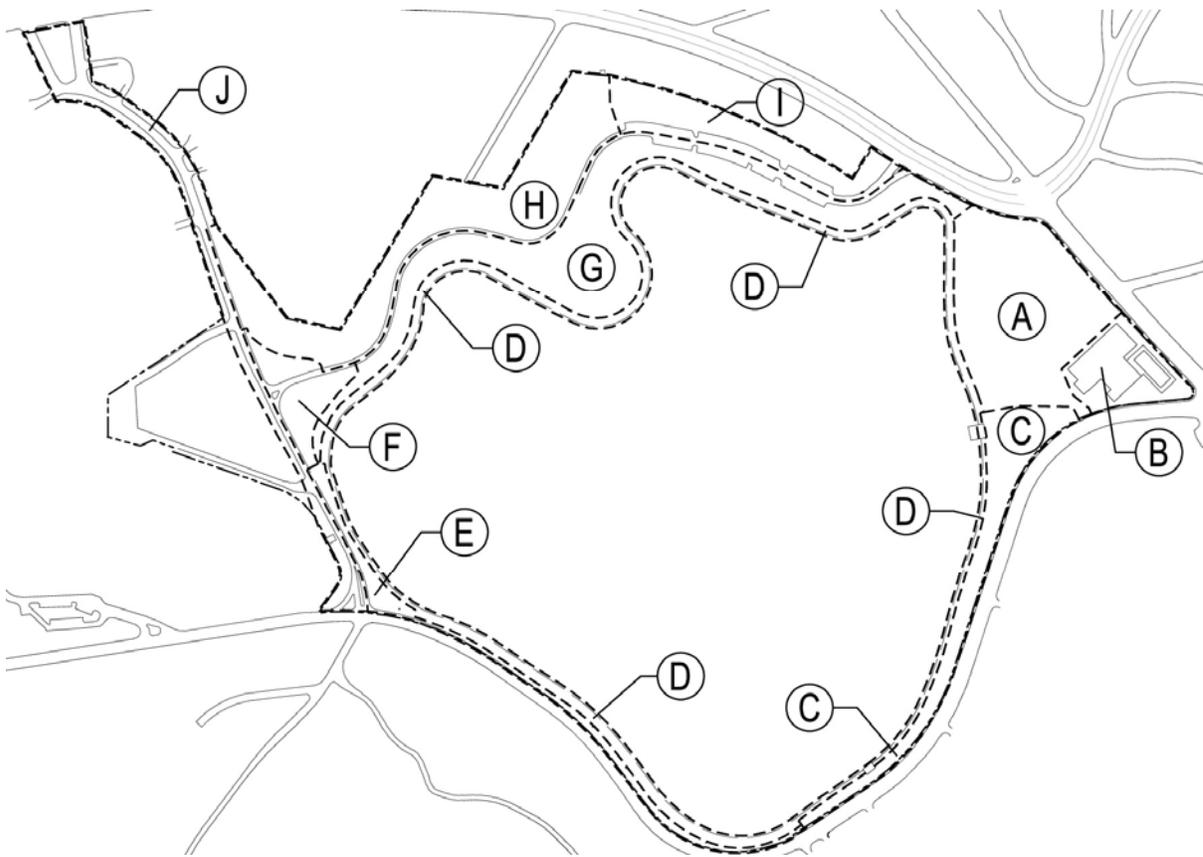


Figure 2.2: Vegetation Management Plan Management Areas

Management Areas Descriptions, Character, and Recommendations

Management Area A: Northeast wooded hilltop

Description

This Management Area includes the wooded hill to the north of the Reilly Memorial Pool and Rink building and extends to Commonwealth Avenue. This Management Area also includes open tree and lawn areas to the west to the rink building and at the intersection of Chestnut Hill Avenue and Commonwealth Avenue.

Maturing stands of Northern Red Oak (*Quercus rubra*) and Eastern White Pine (*Pinus strobus*) dominate the canopy with scattered inclusions of Black Cherry (*Pinus serotina*), White Ash (*Fraxinus americana*), American Basswood (*Tilia americana*) White Oak (*Quercus alba*), Norway Maple (*Acer platanoides*), several large specimen quality European Beeches (*Fagus sylvatica*), and a single Larix (either *Larix decidua* or *Larix kaempferi*). The moderately dense shrub layer contains clusters of Multiflora Rose (*Rosa multiflora*), Red Raspberry (*Rubus idaeus*), and European Buckthorn (*Rhamnus frangula*) with individual Crabapple species (*Malus spp.*) and sapling canopy species. Groundcover species include seedling Norway Maple, Poison Ivy (*Toxicodendron radicans*), Wild Sarsaparilla (*Aralia nudicaulis*), Garlic Mustard (*Allaria officinalis*), false Solomon's seal (*Smilacina racemosa*), Wood Anemone (*Anemone quinquefolia*), Asters (*Aster spp.*), Deer Tongue (*Panicum clandestinum*), and White Clover (*Trifolium repens*). Several of these woody and herbaceous plants are considered invasive plants in Massachusetts, including Norway Maple, Multiflora Rose, European Buckthorn, and Garlic Mustard. These invasive plants have taken over several areas and have displaced native vegetation. There are several very large dead trees in this Management Area. From the top of the hill, there is a natural vista point towards the reservoir. The view here is currently partially obscured by existing vegetation.



Figure 2.3: Panorama of wooded area in Management Area A, Pressley Associates 2006

The tree and lawn areas to the west of the rink building are mostly composed of stands of various large oak species and American Basswood. The turf area is rather sparse with many open, compacted and eroded areas. The existing dirt paths fade into the lawn areas with no definitive edges and the bituminous concrete paths are deteriorated.

The RMP Maintenance Zones within this Management Area A are Woodland (Zone 3) and Tree over Grass (Zone 2).

Character

This area was not technically part of the original planned landscape of the reservoir. Originally privately owned and then becoming a City of Boston park, this area has always been a mostly wooded area as seen in a number of historic aerial photographs. The rock outcroppings along the western side of this Management Area also add to the character of this area and were prominently shown in several historic landscape photographs. The existing character of this area should remain but will be enhanced by some selective pruning, lawn renovation, and woodland management.

Recommendations

The RMP recommends the removal of some of the existing paved and dirt paths in this Management Area followed by the installation of new paths. Many of the paths along the top of the hill are recommended for removal. The old, existing playground area is recommended for removal. The DCR is planning on studying the feasibility of installing a new playground that meets current safety standards and ADA requirements.

Along with the recommended work on the paths and playground, several landscape renovations can occur. Any compacted and eroded landscape areas should be loosened and aerated and followed with provisions to prevent any future compaction or erosion issues. In the area around the existing playground area, from the Beacon Street pedestrian entrance to the reservoir pathway, the current lawn areas should be undergo turf renovation, which can coincide with the installation of the new pathways. Turf renovation typically would occur in areas where lawn is in such poor condition that new lawn needs to be established through an intense reseeding program. See Chapter 3 for more information. The turf grass selected should be shade tolerant. Care should be taken to avoid disturbance and harm to existing tree roots. Once established the lawn should be maintained under Turf Level 2.

Trees in this Management Area should be selectively pruned, particularly for hazardous reduction pruning in the areas planned for new pedestrian pathways. Dead and extremely diseased trees and limbs near pedestrian areas should be removed. The DCR should consider keeping the dead trees in the interior of the woodland and away from pedestrian areas. Dead trees (“snags”) provide habitat for a number of wildlife species. Invasive species

should be controlled along with noxious plants such as poison ivy, with particular attention along pedestrian areas. As invasive and noxious plants are cleared and grubbed, native understory plants should be densely planted to prevent the invasives from re-establishing. Guidelines for woodland area management described in Chapter 3 should be followed.

At the existing natural overlook area, the vegetation between the overlook and the reservoir should be selectively pruned and cleared as necessary to open up this vista point. There are a number of deciduous and evergreen trees below the overlook that should have selected limbs removed as directed by an arborist. Some of the taller understory vegetation should be selectively cleared and replaced with lower growing native plants appropriate for the site conditions. The vegetation should not be completely removed but rather carefully and selectively trimmed and cleared. The purpose of the vista clearing is to partially reveal and frame the view to the reservoir. The final result should be a view through the trees. Once this vista is improved, maintenance to ensure that this vista remains should occur on an annual basis. Selective pruning and clearing will also enhance and reveal the rock outcropping from the reservoir path below.

The RMP recommends enhancing some of the gateways into the Reservoir. There are three of these planned gateways within this Management Area. Loose shrub and select tree plantings, composed of recommended native plants, should frame these gateways. A planting plan, as part of the landscape design for each gateway, will be necessary and should be based on the site conditions and the anticipated DCR maintenance for these areas. Plant design will need to respond to potential pedestrian safety issues. New plantings should include a two-year maintenance agreement for any plants installed by private contractors. Once the new plants are established, the DCR should commit to the continued maintenance of these planted areas. As these plantings are in key visual areas of the Reservation, they should be maintained under Planted Areas Level 2 or 3 based on plant species selected.

At the tree and grass area at the intersection of Commonwealth Avenue and Chestnut Hill Avenue, several of the existing trees require some pruning work to improve their structure and appearance. Invasive vines in the trees should be removed. The DCR should evaluate the possibility of installing a few new trees in this area as future replacements to existing trees. This area should continue to be maintained as shade trees over mowed grass. Turf should be maintained under Turf Maintenance Level 2.

Management Area B: Reilly Memorial Pool and Rink

Description

This Management Area contains the immediate landscape around the Reilly Memorial Pool and Rink. The front area of the Reilly building, facing Beacon Street, is dominated by several trees within a lawn area. The grass is in fair to good condition with some typical lawn weeds present. On the front of the building, there are two perennial planting beds with a group of scraggly Eastern Red Cedars (*Juniperus virginiana*) on the southwest corner. Trees between the building and Beacon Street include several London Planetree (*Platanus x acerifolia*), and various oak and pine species. At the corner of the intersection of Beacon Street and Chestnut Hill Avenue is a grouping of several Eastern White Pines (*Pinus strobus*). The area between the pool and the retaining wall along Chestnut Hill Avenue is mostly grass with a few London Planetrees. Along the eastern side of the building is a dense grouping of various mature oak trees.

The RMP Maintenance Zone within this Management Area B is the Reilly Pool/Rink (Zone 4).

Character

This Management Area is a distinct and almost entirely separate area of the Reservation due to its function as a recreational facility and is frequented by different user groups than the rest of the Reservation. The landscape presents a tree over grass character. The landscape character should serve to enhance the appearance of the

Pool and Rink building. With this in mind, a more ornamental, as opposed to naturalistic, palette of plants can be utilized around the building and pool facing Beacon Street and Chestnut Hill Avenue. The vegetation character should be of a well maintained landscape. On the sides bordering the rest of the Reservation, more natural plantings should occur to act as a buffer.



Figure 2.4: The front of the Reilly Memorial Pool and Rink, Pressley Associates 2005

Recommendations

Based on the final decision for possible leasing the rink and pool, the DCR should consider the feasibility of designing a new landscape plan for the area in front of the building and around the pool. The existing building is unattractive but could be significantly enhanced with the removal and pruning of some of the existing foundation plants and installation of new, ornamental trees, shrubs, and groundcovers. As the view into the pool area is currently wide open from adjacent streets, some minor screening and buffer vegetation, along with some additional shade trees, should be installed on the eastern and south sides of the pool to soften the visual transition from the streetscape to the pool deck edge. Some minor turf renovation is also necessary in some areas in between the building and Beacon Street to fill in bare areas. The existing trees should be pruned by an arborist to improve the structure, form, and appearance of the existing trees. Along the northern and western sides of this Management Area, a vegetative buffer, composed of native shrubs, should be installed to screen views from the other parks of the Reservation. Any compacted and eroded landscape areas on the west side of the rink building should be loosened and aerated and followed with provisions to prevent any future compaction or erosion issues. The lawn area should be ideally maintained under Turf Maintenance Level 1. This would greatly improve the appearance of the area. If existing resources do not allow for this level of maintenance, Turf Maintenance Level 2 is recommended. New shrub and groundcover areas should be maintained under either Planted Areas Maintenance Level 1 or 2 based upon plant species selected.

Management Area C: RMP Historic Restoration Area and associated landscape

Description

This Management Area includes the reservoir dam earthen structure as well as the historic courtyard area at the front of Gatehouse #1 and extending to a portion of Beacon Street. Per the RMP, a portion of this Management Area along the dam was identified as a restoration area in order to re-establish the manicured historic character of this area in 1901. At the time of this writing, the Gatehouse courtyard area remains a staging area for a MWRA construction project and is not under DCR control. This courtyard area is outside of the RMP restoration treatment area.



Figure 2.5: The eastern section of Bradlee basin, 1891

From a distance the dam looks to be covered in lawn grass, but on closer inspection most of the lawn is composed of a variety of weedy herbaceous plants and some woody vegetation, including oak and Black Locust sprouting from cut stumps. Little good quality lawn-type grasses can be found. Years of neglect prior to DCR acquisition have led to the present condition. The DCR and Massachusetts Water Resources Authority (MWRA) are now mowing this area on a semi-regular basis, at times allowing the plants on the steeper parts of the dam slope to grow rather high before being trimmed back. This creates the impression of neglect and allows for the continued annual regeneration of the weedy and woody plants. The steepness of the dam greatly limits the ability to effectively mow this slope. There is an inconsistent edge between the stonedust reservoir path and the lawn area.

The single Red Oak at the base of Gatehouse #1 stairs has severe trunk damage, possibly related to the MWRA staging area. Otherwise there are no other intentionally planted trees or shrubs in this Management Area.

The RMP Maintenance Zone within this Management Area C is Mown Lawn (Zone 1).

Character

Due to past years of neglect and the difficulty in maintaining this area, the character of this area falls short of its potential. The majority of this Management Area falls under the RMP restoration treatment area and therefore, the recommendation is to restore the vegetative character to that present in 1901. This will primarily involve improving the turf areas. Once this turf character is re-established, the DCR will need to commit to a regular maintenance schedule to continue the appearance of this historic landscape. Schematic Plans for the Gatehouse #1 courtyard area are currently being developed. Although this area is technically outside of the restoration treatment area, this associated landscape should reflect a similar, well maintained character once plans are implemented.



Figure 2.6: Existing dam in Management Area C, Pressley Associates 2006

Recommendations

The existing lawn areas along the dam are in such poor condition that ideally a complete lawn renovation is recommended. In order to accomplish a complete lawn restoration, all existing woody vegetation should be cleared and grubbed and grass and weed areas stripped and replaced with new loam and seed. The area may need to be temporarily closed to the public during this period. In order to properly establish the lawn, the seeded area will need to be watered on a regular basis. As there is no active water supply that can be used, one suggestion is to pump water from the reservoir, under an agreement with the MWRA, who continues to control the reservoir. Pumping equipment can be housed in either or both of the Gatehouses.

A complete lawn renovation can be an expensive project for the DCR to undertake and may not be immediately feasible or practical. Another approach would be to try to improve the existing lawn area by more frequent mowing, an annual overseeding program in the fall, and proper fertilization and selective herbicide program. More frequent mowing may eventually control and kill back the undesirable plants. Mowing of the slope may require more specialized mowing equipment than currently owned by the DCR.

Upon lawn establishment, the DCR should commit to maintaining all grass in Management Area C under Turf Level 1. This may require continued use of a water source. It is also recommended that the lawn adjacent to the reservoir path be edged on a regular basis to give a neat finished appearance as seen in historic photographs. If resources and budgets do not allow Turf Maintenance Level 1 management, the grass can be maintained under Turf Maintenance Level 2. In order to maintain the structural integrity of the dam, no major woody vegetation should be planted on the dam per the order from the MWRA. However, the DCR should explore the option, with the permission of the MWRA, of planting a small area of low shrubs on either side of the Gatehouse #2 entry steps as shown in several photographs from the restoration time period.

If the MWRA releases control of the Gatehouse #1 courtyard to the DCR, appropriate new plants and grass should be part any rehabilitation design that respects the historic character within the Management Zone.

Management Area D: Reservoir shoreline

Description

This Management Area exclusively consists of the entire shoreline around the reservoir, typically including the granite rip-rap and the lawn area between the rip-rap and the reservoir pathway. The exception is the lawn area on the inside of reservoir path along the dam. This lawn area is contained within Management Area C. A narrow band of various successional saplings, shrubs, and groundcover species are in this Management Area, typically occurring immediately above and within the granite rip-rap embankments. This area is trimmed back on an annual basis but vegetation quickly resprouts following the mowing and thus blocks views to the reservoir from the reservoir pathway. Several wetland species occur in closer proximity to and within the open water Reservoir. These wetland species include individual White Willow (*Salix alba*), Purple Loosestrife (*Lythrum salicaria*), and Poison Ivy. Successional shrubs and tree saplings include Black Locust (*Robinia pseudoacacia*), oak (*Quercus spp.*), Tree of Heaven (*Ailanthus altissima*), Meadowsweet (*Spiraea alba*), Multiflora Rose (*Rosa multiflora*) and Slippery Elm (*Ulmus rubra*). Groundcover species include Poison Ivy, Cow Vetch (*Vicia cracca*), seedling Gray Birch (*Betula populifolia*), Goldenrod (*Solidago sp.*), Smartweed (*Polygonum caespitosum*), Common Milkweed (*Asclepias syriaca*), Virginia Creeper (*Parthenocissus quinquefolia*), Indian Tobacco (*Lobelia inflata*), Common Tansey (*Tanacetum vulgare*), Butter and Eggs (*Linaria vulgaris*) and various grasses. Black Locust, Tree of Heaven, Multiflora Rose, and Purple Loosestrife are considered invasive plants in Massachusetts.



Figure 2.7: Existing reservoir shoreline in Management Area D, Pressley Associates 2006

Vegetation along rip-rap tends to be densest and composed of more woody species on northern and western side of reservoir, which typically receives the highest levels of sunlight. A large colony of Purple Loosestrife occurs in the shallow water on the western side of the reservoir. Along the southern edge of the reservoir, the vegetation tends to be less dense and more herbaceous although some oak and Black Locust saplings are occasionally found in the rip rap and small areas of White Willow saplings are found just below the waterline.

The RMP Maintenance Zone within this Management Area D is Rip Rap (Zone 5).

Character

Overall there is a general sense of a landscape in neglect. Based on historic photographs, the area between the rip rap and the reservoir path was just composed of lawn and the rip rap was free of vegetation. The existing cutting program is not enough to control the growth and spread of the plants within and above the rip-rap. The character of this Management Area should be returned to historic, well maintained condition with cleared rip rap and clean turf areas.

Recommendations

As a priority project, the DCR should work with the MWRA to immediately start a program to control and eventually eliminate the weedy and woody vegetation in this Management Area. Primary methods should be by manual and mechanic means while more aggressive plants may require some level of chemical control. The MWRA does consider the reservoir a backup water supply so any chemical control should be permitted and coordinated with MWRA and the Boston Conservation Commission. There are several chemical controls considered safe for use around water bodies. See the invasive plant management section in Chapter 3. If resources are not available in the immediate future for this level of removal, it is recommended that the DCR start a program of more regular mowing and trimming. Repeated mowing may eventually deplete the energy stores of some of these plants and will work to control any new seedlings.

Once the vegetation is removed, the DCR should continue to proactively maintain the Management Area and immediately control and remove any new plant material. As much of the invasive and woody saplings are a result of plants growing in adjacent areas, complete control will be difficult unless invasive plants are controlled in these other areas. In addition, it is recommended that the Purple Loosestrife colony and White Willows growing in the water on the western side of the reservoir be controlled or dredged out by the MWRA.

Management Area E: Southwest corner

Description

This Management Area includes the area at the southwest corner of the Reservation from the western end of the dam (Management Area C), then west along Beacon Street, and north along Saint Thomas More Road to Management Area F. As Beacon Street travels westward towards Boston College, there is a rather steep slope from the edge of the roadway down to the reservoir path. A line of Green Ash (*Fraxinus pennsylvanica*) trees are spaced at fairly regular intervals at the top of the slope although there are some gaps along this line of trees. The vegetation on the slope is mostly grass along with other herbaceous and successional shrub species, not unlike species found along the shoreline. The grass in this Management Area tends to be regularly mowed although at some times the grass has been seen quite high. At the intersection of Beacon Street and Saint Thomas More Road behind the entry sign wall is a grouping of several White Oaks and Eastern White Pines over grass.

The RMP Maintenance Zones within this Management Area E are Mown Lawn (Zone 1) and Trees over Grass (Zone 2).

Character

This narrow area located between Beacon Street and the reservoir shoreline acts as a transition between the restoration treatment area in Management Area C and the rest of the Reservation. The experience here allows for a strong experiential connection to the water, but there is noise here associated with traffic on Beacon Street and Saint Thomas More Road. Since the slope is mowed, there is little to buffer this area from the street. Historic photographs show a continuous row of street trees along Beacon Street. Allowing for more trees and shrubs along this slope will help to improve the character of this area and provide a buffer for the reservoir path.



Figure 2.8: Along Beacon Street in Management Area E, Pressley Associates 2006

Recommendations

The existing line of Green Ash trees should remain and be pruned as necessary to improve the trees' form and structure. Any invasive plant material growing on the slope below Beacon Street should be controlled and ideally removed. As pedestrians along the path in this Management Area are subject to the vehicle noise from Beacon Street, it is recommended that a fairly dense but relatively low planting of native woody shrubs, along with some select new trees, be planted along the slope to act as a buffer from the traffic. New trees will serve to fill in gaps in the existing line of trees and should be a variety of native street tree species. New trees will also serve as replacement trees as Green Ashes are relatively short-lived trees. Grass should be limited to areas within four to six feet of the path edge to minimize mowing.

The existing trees at the corner of Saint Thomas More Road should remain and be pruned as necessary. Installation of new ornamental shrubs and groundcovers under the trees and around the sign wall will enhance this vehicular gateway. Continuing north along Saint Thomas More Road, a select number of new shade trees should be spread out along the proposed pathway. Lawn areas to remain should undergo turf renovation as needed. A professional planting plan is recommended for this Management Area.

Once planting in this Management Area is established, this area's vegetation should be maintained on a regular basis as needed with regular pruning and invasive and noxious plant removal. Planted areas, being relatively close to pedestrian areas, should be maintained under Planted Areas Level 2. Lawns should be maintained under Turf Maintenance Level 2.

Management Area F: Intersection of Saint Thomas More Road and Chestnut Hill Driveway

Description

This Management Area is the triangular area at the intersection of Saint Thomas More Road and Chestnut Hill Driveway. The alignment of the roadways and paths and installation of landscape features and plants were improved as part of the MDC design project in 1977.



Figure 2.9: Existing Intersection of Saint Thomas More Road and Chestnut Hill Driveway in Management Area F, Pressley Associates 2005

This Management Area is currently maintained as trees over grass with no shrubs or other understory plants. The grass is in fair to good condition with a few bare areas, particularly alongside the roadway curbs and paths. Typical lawn weeds are present within the turf. Trees consist of American Basswood, Eastern White Pine, Hawthorne (*Crataegus* spp.), and a mix of oak and maple species.

The RMP Maintenance Zone within this Management Area F is Tree over Grass (Zone 2).

Character

This Management Area serves as one of the main vehicular gateways into the Reservation and serves as an entrance to the only remaining section of the historic Driveway. It has an existing open park character and is a good area of sitting and relaxing. The tree over open lawn character should remain with a dedication to improve and maintain lawn and trees along with the other recommended improvements from the RMP.

Recommendations

Existing trees should be evaluated by a skilled arborist for pruning needs and any severely diseased or injured plants should be removed. In coordination with the RMP recommended pathway and landscape design in this Management Area, new trees should be installed to replace any trees removed due to death, injury, or disease in order to maintain the shade tree over grass character. A critical area is at the intersection of the two roadways, which should be “framed” with new shrub and groundcover plantings as an enhancement along with the entry walls proposed in the RMP. A professional planting plan is recommended.

If resources and budgets allow, the DCR should consider Turf Maintenance Level 1 and Planting Level 1 for this area due to its high visibility and importance as a Reservation gateway. If DCR resources do not allow this level of maintenance, maintain under Turf Maintenance Level 2 and Planted Area Level 2.

Management Area G: Wooded slope north of Reservoir

Description

This Management Area includes the area on the north side of the reservoir between the outside edge of the reservoir path and the centerline of Chestnut Hill Driveway. It is dominated by the steep, south-facing slope and is mostly comprised of an upland forest similar to Management Area A. Due to the full southern exposure of the slope, the understory vegetation is very dense and diverse. There is also a wooded knoll with a small grassy open area near the tip of the knoll. A narrow mown grass strip of varying width exists between the perimeter path and the bottom of the slope. Another area of mown grass runs parallel to the dirt path on the south side of Chestnut Hill Driveway. Both lawn strips have bare and compacted areas and contain large amounts of lawn weeds.

Maturing stands of northern red oak, white pine, and eastern red cedar dominate the canopy with inclusions of Tulip Poplar (*Liriodendron tulipifera*), American Basswood, Black Cherry, Black Locust, Northern White Oak, and Norway Maple. The moderately dense shrub and small tree layer contains Sassafras (*Sassafras albidum*), Tree of Heaven, Forsythia varieties (*Forsythia x intermedia*), Multiflora Rose, Red Raspberry, European Buckthorn, Winged Euonymus (*Euonymus alatus*), and Porcelain Berry (*Ampelopsis brevipedunculata*) with individual sapling canopy species. Groundcover species include Poison Ivy, Wild Sarsaparilla, Garlic Mustard, Deer Tongue, and White Clover. In the grass median along the parallel parking area is a row of good quality Pin Oak (*Quercus palustris*). On the western end of the slope approaching Boston College, the dominant trees are Eastern Red Cedar with understory mostly comprised of invasive shrubs and groundcovers. Poison Ivy vines have grown up in a number of the trees in this area and hang down into the pathway on the other side of the fence. Invasive plant species have significantly displaced other plant species and, along with tall native species, have grown to the point where several views to the reservoir have been blocked.



Figure 2.10: Wooded slope in Management Area G, Pressley Associates 2006

In the fall of 2006, a crew of volunteers removed a small but dense section of ailanthus on the slope just below the intersection of Chestnut Hill Driveway and Commonwealth Avenue. After removal, the ground surface of the slope was totally bare with the exception some grass and other low herbaceous plants. Stumps of the ailanthus remained. There is another dense area of ailanthus immediately to the west of this cleared area and more ailanthus immediately below the “dipped” path, blocking a view to the reservoir from the pathway.

The existing woody and herbaceous vegetation in the area immediately below the Chestnut Hill Driveway overlook was cut back in 2005 in order to regain the view to the reservoir. The vegetation here was trimmed to the ground, but the stumps and rootstock remained. In the past two years, this area has begun to resprout and grow back along with several invasive plant species.

The RMP Maintenance Zones within this Management Area G are Mown Lawn (Zone 1), Tree over Grass (Zone 2), and Woodland (Zone 3).

Character

This Management Area is a highly visible part of the Reservation, seen by pedestrians both along the reservoir path and Chestnut Hill Driveway. Based on historic photographs, this Management Area was wooded much as it is now but did have some open areas under trees to allow views to the reservoir from Chestnut Hill Driveway and the knoll area. Along with the reservoir shoreline, it is also the area most infested by invasive and noxious plants. The character of this Management Area should remain primarily wooded while also allowing views to the reservoir from the Chestnut Hill Driveway area above. Automobiles parked along the Driveway from the reservoir should also be screened so they do not take away from the “urban oasis” of the rest of the Reservation. The views of rock outcroppings as seen from the reservoir path also lend to the character of this Management Area and these views should be maintained and enhanced.



Figure 2.11: Wooded knoll in Management Area G, Windows Live

Recommendations

Trees in this Management Area should be selectively pruned, particularly for hazardous reduction pruning at the top and bottom of the slope adjacent to the pedestrian pathways. Throughout this Management Area, invasive plant species in the understory should be removed and/or controlled along with Poison Ivy, which is a particularly bad problem where it overhangs into the path along Chestnut Hill Driveway. The area cleared of alianthus in Fall 2006 should be monitored as aggressive resprouting will very likely occur in the Spring. Remove and control any of these resprouts as discussed in Appendix D. Clearing and grubbing of this area is recommended. Other alianthus areas should be controlled and removed as well to prevent additional spread. As invasive plants are removed, native understory trees, shrubs, and groundcovers should be densely planted to help prevent the invasives from re-establishing. Guidelines for woodland area management described in

Chapter 3 should be followed. The lawn strip at the bottom of the slope should undergo turf renovation as needed and should ideally be minimized to only a four to eight foot strip alongside the reservoir path or as needed for the maintenance of the drainage swale at the bottom of the slope. These lawn areas should be maintained under Turf Maintenance Level 2. Selective pruning and clearing will also enhance and reveal the rock outcroppings as seen from the reservoir path below.

Along the western end of this Management Area, the section of Eastern Red Cedar with its heavily infested invasive understory should be treated as a vista area to allow views of the reservoir from Chestnut Hill Driveway. In order to accomplish this goal, there will need to be careful selective clearing and pruning of existing tree and shrubs along with control of invasive plants. Additional low-growing shrubs, groundcovers, and perennials should be planted to replace the invasive plants and to stabilize the bank. Plants selected should be native and suited for the site conditions. Turf areas should be minimized to only a four to eight foot strip alongside the reservoir path or as needed to maintain the swale at the bottom of the slope. This area should be maintained under Turf Maintenance Level 2 and Planted Area Level 3.

Along Chestnut Hill Driveway, the RMP recommends the modification of the parallel parking area and the redesign and paving of the pathway. Along with this project, new street trees and some shrubs areas should be planted along the Driveway. The trees should be irregularly spaced to provide a more natural planting design as opposed to a linear street tree design. Additional shrubs should be installed at the proposed pedestrian entrance into the “knoll” area. Lawn areas along Chestnut Hill Driveway should undergo turf renovation as needed and maintained under Turf Maintenance Level 2.



Figure 2.12: Existing conditions at Chestnut Hill Driveway overlook, Pressley Associates 2006

The open area in the woodlands on the knoll should be enhanced and slightly enlarged to provide another passive area within the Reservation. Existing low woody vegetation and invasive plants within this proposed clearing should be removed and new lawn or meadow grass seeded. The idea is to create a “natural clearing in the woods” reminiscent of the landscape seen in historic photographs. As such these lawn areas should be maintained under Turf Maintenance Level 3 to allow for a more natural appearance. In order to create a semi-open view of the reservoir from the cleared area, there should be selective vista pruning and select understory removal between the cleared area and the reservoir pathway. The area cleared for the vista should be replanted with lower growing native plants appropriate for the site conditions. The purpose of the vista clearing is to partially reveal and frame views to the reservoir. Any new plantings should be under Planted Area Level 3.

As described in the Priorities section, the area below the Chestnut Hill Driveway overlook should be completely cleared and grubbed to make way for a new overlook planting plan. Plants should be relatively low growing to allow views, appropriate for the site, and require minimal long-term maintenance. Another goal is to partially screen some of the automobiles parked along Chestnut Hill Driveway. As this area was signaled by the Working Group and the DCR as a high priority for the VMP, a proposed planting plan is included in Appendix B. For clearing and grubbing, all shrub rootstock down to a maximum of eighteen inches below grade and all large tree rootstock down to a maximum of two feet below grade should be removed, but disturbance should be minimized as much as possible. Tree stumps can be grounded. Care should be taken by the contractor to avoid damage to existing adjacent trees and shrubs to remain. This amount of clearing and grubbing is necessary to allow for the best possible growing environment for the proposed plants. It is recommended that this clearing and grubbing operation be carried out manually by an experienced landscape contractor.

Once the existing vegetation and stumps are removed, there will be some loss of existing soil. Good quality topsoil should be brought in to restore the slope to the original grade, which is estimated to be at approximately 2.5 to 1 based upon topographic information from MassGIS. After the installation of topsoil, the new plants should be carefully planted from the top of the slope down. If a private contractor is used for this job, the contractor should be responsible for maintaining the plants during a two-year establishment period. Although the plants selected for the planting plan should work well in the environment presented, the southern exposure of the site may probably require the need for watering during plant establishment. As suggested for Management Area C, water can be pumped from the reservoir with a DCR agreement with the MWRA. Water can also be brought in by truck from Chestnut Hill Driveway. Once the plants are established and maintenance is released to the DCR, the DCR should monitor the area on a regular basis to prevent the growth of any invasive or undesirable vegetation as well as to ensure that no plants grow tall enough to significantly block the view. This area should be maintained under Turf Maintenance Level 2 and Planted Area Level 3.

Management Area H: North wooded area

Description

This Management Area contains the dense wooded area between the Chestnut Hill Driveway and the northern border of the Reservation abutting Wade Street and the Evergreen Cemetery. The Chestnut Hill Reservoir Gardens is also within this Management Area. Similar to the wooded areas in Management Areas A and G, this area is mostly comprised of large Northern Red Oak, Black Oaks, and Eastern White Pine. There is also a section of several Norway Spruce (*Picea abies*). The understory layer in this area is much less dense than the other wooded areas, possibly due the high amount of shade from the overstory trees, although understory growth is denser at the edge of the woods along Chestnut Hill Driveway. There are also much fewer examples of invasive species in this Management Area. Groundcover species include Poison Ivy, Wild Aarsaparilla, Garlic Mustard, False Solomon’s Seal, Wood Anemone, and Aster. There is a large population of Poison Ivy, both in vine and ground cover form, in the area immediately around the garden. Aside from the trail from the end of Wade Street and the Chestnut Hill Driveway sidewalk, there are no other pedestrian pathways in this Management Area so this Area is less affected by human interaction than the other Areas. Alongside the

sidewalk on the north side of Chestnut Hill Driveway, there is a thin strip of mown grass between the sidewalk and the woodland edge.

The RMP Maintenance Zones within this Management Area H are Woodland (Zone 3) and Chestnut Hill Reservoir Gardens (Zone 7).



Figure 2.13: Along Chestnut Hill Driveway in Management Area H, Pressley Associates 2006

Character

This Management Area is probably the most natural area of the Reservation, closely resembling the ecology of the oak/hickory association forest that dominates the upland areas of northeastern Massachusetts. Historically, these woods were considered to be a buffer from the adjacent land uses. Aside from users of the garden and pedestrians on the Chestnut Hill Driveway sidewalk, this Management Area is not typically used by visitors to the Reservation. This Management Area should continue to be treated as a buffer area and natural woodlands separating the Reservation from the Evergreen Cemetery and Wade Street neighborhood.

Recommendations

Trees in this Management Area along the edge with Chestnut Hill Driveway should be selectively pruned, particularly for hazardous reduction pruning and to allow for vehicular clearance. The DCR should consider keeping the dead trees in the interior of the woodland that are away from pedestrian areas since they do provide habitat (snags) for a number of wildlife species. Invasive species, though minimal, should be controlled throughout the woodland and the poison ivy in the areas adjacent to the garden and the trail connecting to Wade Street should be ideally removed. As invasive plants and Poison Ivy are removed, native understory plants

should be densely planted to prevent these plants from re-establishing. Any new plantings should be maintained under Planted Areas Level 3. Guidelines for woodland area management described in Chapter 3 should be followed for continued forest regeneration and sustainability.

The mown grass area along the sidewalk should be limited to a maximum of three to five feet in width to minimize maintenance needs in this area. Mowing should not occur any deeper than this width in order to encourage natural regeneration along the woodland edge. Any invasive plants or plants encroaching onto the sidewalk and interrupting pedestrian or vehicular movement should be pruned or removed. This narrow lawn area should be maintained under Turf Maintenance Level 2.

Management Area I: Wood and grass area by Chestnut Hill Driveway parking area

Description

This Management Area consists of the tree and mown grass area along the middle northern border of the Reservation and immediately abutting the grouping of five apartment buildings along Commonwealth Avenue. The trees scattered throughout this Management Area are mostly composed of a mix of mature Northern Red Oaks, Black Oaks, Norway Maples, and Eastern White Pines. There is a single Ginkgo tree (*Ginkgo biloba*) and a few Sassafras and smaller Black Cherry trees. Near the intersection of Chestnut Hill Avenue and Commonwealth Avenue are two large European Beeches along with two large dead beech trees. The soil area around these beeches is extremely compacted due to vehicular parking in this area, possibly resulting in the death of the two beeches. There are also a number of shrubs planted primarily behind the apartment buildings. This area is typically maintained and mown by the apartment buildings. The grass is in fair to poor condition, depending on the area, with a few bare areas. Lawn weeds are commonly seen. In the Fall of 2006, there was a small area of the lawn that was reseeded and new grass appeared to be coming in well.

The RMP Maintenance Zone within this Management Area I is Tree over Grass (Zone 2).



Figure 2.14: Existing trees and grass in Management Area I, Pressley Associates 2005

Character

This Management Area has a strong park-like tree over grass character. The large shade trees provide a partial visual buffer of the large apartment buildings as seen from Chestnut Hill Driveway and the rest of the Reservoir. But the area also visually appears to part of the apartment buildings just across the northern Reservation property boundary and Reservation visitors may feel they are crossing into private property when entering this area. As mentioned in the RMP, this area seems to serve as a “backyard” to the apartments. Several exposed rocks add character to this area.

Overall the tree over grass character should remain but the addition of a few understory trees and shrub masses in select areas will help to strengthen the vegetated buffer and to better define the boundary of the Reservation against the apartment buildings. The idea for this area is to reconnect this area to the Reservation rather than be a visual landscape to the apartment buildings.

Recommendations

The RMP recommends for the DCR to “reclaim” this Management Area as part of the Reservation. The DCR should either wholly maintain this Management Area or work out landscape maintenance agreements with the owners of the apartments so that maintenance is consistent with the goals, guidelines, and recommendations of the VMP and RMP.

All trees should be evaluated by an arborist for selective pruning and removal, especially for hazardous conditions as this area is regularly used by pedestrians and apartment residents. The two dead beech trees near Commonwealth Avenue should be immediately removed. New replacement trees should only be installed once any soil compaction issues are solved by restricting vehicular access and followed by loosening and aerating the soil. Any new or replacement tree should be appropriate for the site conditions. New native understory trees and shrubs should be installed in select areas to increase the screening of the buildings. Along the northern property line, massing of shrubs, as opposed to a fence, can be used to define the boundary between the Reservation and private property.

Lawn areas should undergo turf renovation as needed to repair bare and compacted areas with the use of shade and foot traffic tolerant seed mixes. As this area does receive a good deal of use, the lawn should be evaluated on an annual basis for the need to reseed and aerate. Otherwise this Management Area should be maintained under Turf Maintenance Level 2.

Management Area J: Saint Thomas More Road

Description

This Management Area encompasses the thin area of Reservation land on either side of Saint Thomas Road from Beacon Street to Saint Thomas Moore Road with the exception of areas covered under Management Areas E and F. The landscape is mostly composed a narrow band grass alongside the roadway curb and sidewalk with a scattering of medium-sized street trees. The lawn areas are in fairly good condition with some worn and compacted areas immediately adjacent to the edge of the sidewalk, probably due to a combination of pedestrian foot traffic and road salt damage. The lawn appears to be mowed on a regular basis. Most of the trees are Red Oaks that were installed as part of the 1977 MDC improvements. Originally these trees were shown on plans being planted approximately thirty feet apart. It is apparent that several of the trees planted did not survive, and there are gaps in the once continuous line of trees. Several stumps can still be seen were these trees were originally planted. At the Commonwealth Avenue intersection, there is a traffic island that essentially serves as a vehicular gateway for Boston College. Trees planted in these islands are mostly crabapples which appear to have been planted prior to the 1977 improvements.

It is understood that the landscape staff from Boston College typically maintains the lawn area that abut the campus. It is assumed that Boston Parks and Recreation maintains the small lawn area adjacent to the Evergreen Cemetery.

The RMP Maintenance Zone within this Management Area J is Boston College/Evergreen Cemetery Management Area (Zone 6).



Figure 2.15: Existing landscape in Management Area J, Pressley Associates 2005

Character

The character of this Management Area is more typical of DCR's tree-lined urban parkways, but this area does not necessarily seem like an integral part of the Reservation due to its proximity to Boston College. Most of the pedestrian use in this area is associated with students and faculty of Boston College. Landscape improvements and increased maintenance to this area will help to improve the "parkway" appearance and character.

Recommendations

Recommended landscape improvements to this Management Area should focus on turf restoration and street trees. A maintenance agreement should be reached between the DCR, Boston College, and Boston Parks and Recreation to determine the landscape responsibilities for each of these parties.

Lawn areas should be renovated with a recommended annual fall overseeding program and proper seasonal fertilization program. Compacted soil areas should be prepared for new grass establishment by soil loosening and aerating along with the addition of new loam as needed. New street trees, preferably oak to match the

existing trees, should be planted to fill in the gaps between existing trees although other appropriate native street trees should be considered to add some diversity. Existing trees should be pruned to improve structure and vigor. No shrubs or woody groundcovers are recommended for this area.

The lawns in this Management Area should be maintained under Turf Maintenance Level 2.

Chapter 3

Landscape Maintenance Guidelines

To sustain and enhance the Reservation's vegetative resources, the following landscape maintenance guidelines serve to address the goals of the VMP and seek to establish a higher baseline of vegetation maintenance standards than currently exists. These guidelines should be used in conjunction with the VMP Chapter 2 recommendations and balanced with the other proposed treatment recommendations set forth in the Chestnut Hill Reservation Resource Management Plan. A maintenance program for new and existing vegetation should be based upon the type of plant material and the time and abilities of park staff, equipment available, and budgets. Per the RMP, some areas, such as the 1901 RMP Restoration Area, will require a higher level of maintenance than other areas.

The Landscape Maintenance Guidelines in this chapter are under the categories of:

- Soil Testing
- Lawns
- Planted Areas
- Tree and Woodland Management
- Pest and Disease Management
- Invasive Plant Management

Soil Testing

The soil in the landscape is the most important natural resource in the park as it sustains all plant life, including trees, shrubs, and especially turf grass. All decisions for lawn maintenance and renovation and plant installation should be based upon the results of soil testing. Soil tests should be done in selected areas on an annual basis. Without information from soil testing, all management decisions regarding the soil will result in guesswork. Ideally soil tests should be conducted in early spring (March) for best results. Fertilizer, lime, and other recommendations included in the soil test results should be followed.

Lawns

The quality and appearance of lawn areas greatly affects the aesthetics of any park. Bare and weedy lawn areas project a lack of overall park maintenance. Well maintained lawn areas, even when other areas of the park are not maintained as well, greatly enhance the park's public perception.

Lack of adequate DCR maintenance resources in addition to poor maintenance practices by the MWRA prior to the 2002 MDC-MWRA agreement have lead to unsightly, weed-infested lawns and, in some areas, bare, compacted soil. Improved maintenance of turf areas should be based on best modern day lawn practices.

In order to improve the appearances of lawn area throughout the Reservation, a turf renovation schedule should be established. Turf renovations should first concentrate on the areas that are most visible and commonly used. Frequency of renovation can vary from annually to every 5 years based on lawn conditions and available resources and budgets. Since the dam has been called out as an historic restoration area in the RMP, this area may warrant annual reseeding, liming, fertilizing, and weed control to maintain a high quality turf appearance. Other important and highly visible areas, which can be done on a less frequent schedule, include the area around the Reilly Memorial Pool and Rink, at the intersection of Saint Thomas More Road and Chestnut Hill Driveway, and the intersection of Commonwealth Avenue and Chestnut Hill Avenue. Also any erosion areas and desire line pathways should be repaired and reseeded on an annual basis.

Proper lawn management practices include:

- Mowing
- Fertilization
- Liming
- Aeration
- Dethatching
- Reseeding
- Weed control

Mowing

Without mowing, most turf grasses will grow to heights of two or three feet. Limiting turf to two to two and one-half inches puts tremendous stresses on the plant and increases the level of necessary inputs, especially watering. Turf that is cut higher (three to four inches) is better able to withstand the pressures of foot traffic, equipment traffic, and drought. Proper mowing practices and equipment minimize this stress. Grass clippings are to be left on all turf areas if they are cut on a regular basis. This practice will decrease fertilizer requirements, increase the health of the turf's root system, and eliminate the need for disposal or composting of grass clippings. But grass clippings that are too long (due to delayed mowing) should be collected and removed as these clippings greatly add to the thatch layers.

Lawns can be mowed on various schedules based upon location and function within the Reservation and on the time of the year which affects the growth rate of the grass. Grass must be mown on a regular basis to keep it healthy as grass is weakened if allowed to grow too long between mowing, making the lawn susceptible to weeds, pests, and disease. Grass growth should be monitored and mowing frequency increased in order to avoid removing more than one-third of the grass blade. Mowing patterns should be alternated to avoid ruts and compacted soils. Mowing should not be done when the grass is wet.

Trimming should be coordinated with the mowing schedule. Trimming should be done with walk-behind mowers and string trimmers. In Turf Maintenance Level 1 areas along paved areas, the lawn should be edged on a regular basis to give a neat finished appearance.

Fertilization

Fertilizing the lawn is essential to the basic health of the lawn and provides the essential nutrients for grass growth. The results of the soil testing will indicate the appropriate amount and type of fertilizer to use and at what times of the year to apply.

Liming

Lime is used to adjust the soil pH to the best range for grass growth. Soils in this area of New England are naturally acidic on the pH scale of acidic to alkaline. This acidic condition can be reduced by applying limestone on a regular basis. The benefit of this is that more of the natural nutrients in the soil become more available to the lawn grasses. Annual limestone treatments result in a soil condition that will enable a lawn to reach its fullest potential and best appearance with proper fertilization, mowing and watering.

Soil pH for turf should be between 6.0-6.5. Base saturation for potassium (K) should be 2-4%; magnesium (Mg) should be approximately 14%; and calcium (Ca) should be 60-70%. As with fertilizer, the specific amount of lime can only be determined with a soil test. The best time to apply lime is in the late fall or early winter so the melting snow and spring rains will help to work the lime into the soil. Lime should never be applied at the same time as fertilizer.

Aeration

Power core aeration is one of the most important cultural practices for lawn areas. Aeration is especially important in areas subject to soil compaction. Aeration removes plugs of soil 1" to 3" in length. These cores slowly break down back into the lawn over a few weeks time. The holes allow for the easier infiltration of fertilizer, water, and air into the root zones of the plant while relieving soil compaction. This results in stronger, healthier root systems. The best time for aeration is the fall. Aeration in the most visible areas of the Reservation should be performed at least once every one or two years. Aeration in the immediate area around trees is not recommended as damage to the tree roots may result.

Dethatching

Thatch is the layer of living and dead stems, roots, stolons, and rhizomes between the green blades of grass and the soil surface. Over time, the thatch layer builds up and becomes so thick that water, air, and nutrients cannot enter the soil. Thatch thickness should be monitored and dethatching should occur when the thatch is thicker than half an inch. The best time for dethatching is in late spring or early fall when the grass is still actively growing.

Reseeding

In New England, reseeding of bare and thin spots in lawn areas is best done in the early fall (September - October). Reseeding should be done in time for the grass to become established before the winter cold. High quality seed should be selected for the site conditions (sunny, shade, moist, dry) where the grass is to be seeded. In the Northeast, cool-season grasses are recommended for park areas. These grasses are characterized by maximum growth in the spring and fall and are semi-dormant during the hot and dry periods of summer. Individual species of grass can be used alone or in mixtures to produce a dense lawn. The principal species of cool-season grasses for lawns are: Kentucky bluegrass, perennial ryegrass, tall fescue and fine fescues (creeping red, chewing and hard). For sunny lawn areas, mostly Kentucky bluegrass varieties are best with small amounts of perennial ryegrass and fine fescues in the mix but only if the area is going to be fertilized regularly as bluegrass is a heavy feeder. For shady areas, a higher percentage of red fescues should be in the mix with shade tolerant Kentucky bluegrasses and perennial ryegrass.

First, remove all weeds, dead grass, and debris from the area being reseeded. Loosen the soil to about three inches deep with a broom rake. Compacted areas are best loosened to a depth of six inches. Spread fertilizer at the recommended rate to nourish the seeds as they sprout. Before spreading the seed, wet the soil. Spread the seed at the recommended rate based on the type of grass. Gently rake in the seed to cover the seed with a thin layer of soil. Lightly tamp the soil. To protect the seed from birds and to conserve soil moisture, cover the seed with straw or netting. Only clean straw should only be used as hay will contain weed seeds. Keep the soil moist. It is best to water the seeded area twice a day. Slice seeders are a mechanical method of restoring large areas of lawn and greatly speeds up the restoration process. It is recommended that snow fencing be used to closed off reseeded areas from the public to prevent disturbance during the grass establishment period.

Weed control

Using the proper cultural practices outlined above, a healthy lawn is usually able to outcompete most weeds. In most situations, a certain amount of weed growth can be tolerated. However if an area of lawn becomes overrun with excessive weed growth that seriously affects the appearance of the lawn, a plan using integrated pest management (IPM) techniques should be put into effect. IPM combines cultural practices with minimal and judicious amounts of chemicals to control weed and pest problems.

Planted Areas

Shrubs and groundcovers provide numerous functions and are a vital part of a park landscape. When properly selected and maintained, they serve as focal points, accents, help control circulation, and provide an aesthetic

appearance, complimenting and enhancing the surrounding park landscape. Currently, the vegetated areas of the Reservation are mostly composed of lawn areas, scattered trees, and natural wooded areas with only a few maintained, ornamentally planted areas at the Reilly Memorial Pool and Rink and behind the Commonwealth Avenue apartment buildings. As new planting areas are established, the DCR will need to set up a maintenance plan for the upkeep of these areas in accordance with the recommended Planted Areas Maintenance Levels established for each Management Area.

It is recommended the DCR require a two-year maintenance period for any new planted areas installed by contractors. Two years is typically the time necessary for most plants to become established, no matter how well suited they are for the site. The number one item required for establishment is regular and appropriate watering. Once a plant is properly established, its chances of surviving through full maturity are greatly increased and maintenance and water demands are decreased. During this two-year establishment period, the contractor, not the DCR, will be responsible for the establishment of the plants. The contractor, following the completion of plant installation, will be responsible for:

- Watering
- Fertilizing
- Weeding and removal of invasives
- Mulching
- Disease and pest control
- Replacement of any dead or severely declined plants

Following the completion of the two-year maintenance period, responsibility for the plants will be handed over to the DCR. This maintenance period requirement is now standard for the City of Boston and the Boston Parks and Recreation Department.

Watering

Plants can suffer from excessive as well as insufficient amounts of water. Watering is critical in the first two seasons after planting and especially if any drought conditions arise. After that period, many plants, if properly selected for the site conditions, should be able to survive with only natural rain water.

Fertilizing

The type and amount of fertilizer to use during the two-year establishment period should be based on both a soil test and the species of plant. Ideally, properly selected plant material for the site will require little to no fertilizer once established.

Weeding and removal of invasives

Due to soil disturbance in newly planted areas, weeds and invasive plants may readily start growing in newly planted areas. Any and all weeds and other undesirable plants should be removed, preferably through manual methods, on a regular basis. Invasive plants should be immediately controlled as some invasive species can quickly establish and take over newly planted areas.

Mulching

Newly planted shrub and groundcover areas should be maintained with a two to three inch layer of mulch throughout the year. As well as helping to retain soil moisture, an organically-based mulch will break down and provide nutrients to the plant. Mulch is best applied in the early spring but can also be applied in the late fall to protect plant roots as the soil freezes and thaws.

Disease and pest control

If a disease or pest problem arises during the establishment period for newly planted areas, the problem should

be dealt with immediately to prevent any loss of installed plants. It is recommended that IPM techniques be employed. See the Pest and Disease Management section below for more information.

Replacement of any dead or severely declined plants

The contractor will be responsible to replace any dead or severely declined plant during the establishment period. Replacement plants should be the same species and size as originally installed.

Trees and Woodland Management

The woodland association typical of upland areas in this area of eastern Massachusetts is the oak/hickory association. The canopy is dominated by Northern Red, White, Black, Scarlet and Chestnut oaks. Growing with the oaks are Shagbark Hickories, Tulip Poplars, and Basswoods. In the lower layers are small trees and shrubs; dogwoods, Hop Hornbeams, Sassafras, serviceberries, Witch-hazels, Winterberries, Pinxterbloom Azaleas, Lowbush Blueberries, and viburnums. The herbaceous layers are represented by asters, Wood Anemones, Columbine, Lady's Slipper, Mayflower, Wild Geranium, Solomon's Seal, Goldenrod, and a number of ferns including Christmas Fern, Wood Fern, and Shield Fern.

Some of the above species are well represented within the woodland areas of the Reservation; others are not. Through the maintenance program, the DCR should encourage the continued growth and regeneration of native trees in trees over grass and woodland areas in the Reservation. More than any other landscape element, trees provide the most prominent visual component in the landscape. Tree preservation and management involves the protection of the canopy, trunk, and roots. Trees in public parks are subject to intensive visitor use. Over time this use can have severe impacts with ongoing public use including the following impacts:

1. Compaction and lack of soil fertility begins to change the soil both physically and chemically.
2. Rainwater begins to runoff (causing soil erosion) rather than percolating down through the soil and to the plants' roots.
3. Groundcover materials such as turf or understory are lost or damaged.
4. Exotic and/or invasive species begin to seed in the woodlands and the character of the woodland begins to deteriorate.
5. Native shrubs and native understory trees are lost to invasives and to overuse of the areas.
6. Older native trees cannot compete for nutrients and water and begin to decline; tops die back.
7. Areas become so impacted that users begin to seek other locations.

The Reservation staff must be vigilant to spot these trends early and initiate corrective practices such as liming, fertilization, and corrective pruning. Individual trees are a very visible part of the landscape and efforts should be focused on maintaining the health and good form of these trees. These practices will be typically used on individual trees but not normally used in more natural woodland situations.

The control of invasive species in woodlands areas is an intensive and recurring task. Smaller plants can be hand pulled but larger plants will need more intensive removal and control methods. With deliberate management, those portions of the understory dominated by invasive species can be replaced with an understory comprised of sustainable native woody and herbaceous species.

By using best urban forestry management practices, the woodland area should be a sustainable and self-regenerating forest. Age diversity in the canopy layer is a long-term goal. Ideally the trees should be of all ages with every stage present from newly established plants to past maturity. There should be a selective removal (thinning) of young trees to allow for improved growth of select young trees. Thinning allows for less competition for light, air, and nutrients. Thinning greatly improves the health of individual trees and the woodland as a whole. Maintaining an active and healthy forest layers is imperative for a healthy ecosystem. An ideal, healthy urban forest, much like a forest in more natural situations, should be composed of several

vertical layers: overstory canopy, intermediate canopy, tall shrub understory, low shrub understory, and herbaceous/groundcover layer. Leaf fall should not be removed in woodland areas but should be allowed to accumulate and decay on the woodland floor. Leaf litter and fallen dead twigs and branches left in place provide nutrients for the soil, prevent erosion, provide forage and habitat for wildlife, and necessary for a self-regenerating woodland.

Ideally, all trees, but especially the most visible individual trees, will be inspected annually and treated according to the integrated pest management (IPM) requirements.

Dumped trash should be picked up in woodlands on a regular basis. Signs and posters should never be allowed to be hung on any tree. Benches, trash cans, bicycles, and other objects should never be chained to any tree. Extreme caution is a must when using string trimmers and mowers around tree trunks and roots to avoid damage to the bark. Vehicles or other heavy equipment should never be allowed to park under trees as soil compaction can seriously affect the long-term health of trees and other plants. Salt use should be limited along roadways as salt affect the soil's chemical balance.

Pruning and Hazardous Tree Removal

Tree pruning applies to both existing and new trees in all Management Areas within the Reservation. Periodic removal of dead and broken branches improves the appearance and structure of trees, but more importantly removes hazards to users of the Reservation. Shrub pruning, depending on the shrubs habit and location and function within the Reservation, may be necessary in some of the planted areas.

Many of the existing trees need pruning to re-establish a more healthy form and to remove dead limbs. Tree thinning and the removal of crossing branches also help to create desirable and healthy tree form. Several other trees are either dead or in a state of such poor health that they pose a threat to public safety and warrant complete removal. Dead trees that a sufficiently located away from pedestrian and vehicular areas can remain to provide bird and other wildlife habitat. An experienced and licensed Arborist shall perform or supervise all pruning operations. Pruning work should be performed to all current standards.

For any new paths to be created in woodlands, all existing woody vegetation should be removed to a minimum of five feet from both edges of the path. Ideally paths should be designed to avoid any tree greater than five inches in diameter, although this is not always possible. For both new and existing paths, lower branches of existing trees adjacent to the path should be removed to a minimum of eight feet above the surface of the path to allow proper clearance. The cleared and pruned areas should be regularly monitored and maintained to prevent growth into the paths.

Pruning and removals shall conform to the following:

- American National Standards Institute (ANSI): Standard A300, latest edition, Standard Practices for Tree Care Operations – Tree, Shrub and Other Woody Plant Maintenance.
- American National Standards Institute (ANSI): Standard Z-133.1. latest edition, Safety Requirements for Tree Care Operations – Pruning, Trimming, Repairing, Maintaining, and Removing Trees, and Cutting Brush.

Types of Tree Pruning

1. **Crown raising** consists of the removal of the lower branches of a tree in order to provide clearance over walks and drives.
2. **Crown reduction** consists of heading back or removing branches to clear buildings and other structures.
3. **Crown restoration** improves the structure, form and appearance of trees, which have been severely

headed, vandalized, or storm damaged.

4. **Crown thinning** is the selective removal of branches to increase light penetration, air movement, and to reduce weight.
5. **Hazard reduction pruning** consists of removing visible hazards in a tree, including all dead, diseased, and weak wood over two (2") inches in diameter.
6. **Vista pruning** is selective thinning of framework limbs or specific areas of the crown to allow a view of an object from a vista point

Standards for Tree Pruning

1. All pruning shall be performed by or under the supervision of a certified arborist and in a manner which maintains the natural aesthetic characteristics of the species and variety of trees. No topping or dehorning of trees or stubbing back of branches shall be permitted. All cuts shall be made to a lateral branch a minimum of one third (1/3) the size of the branch being removed.
2. The use of climbing spurs or spiked shoes shall not be permitted for pruning trees.
3. All cuts shall be made sufficiently close to the parent stem so that wound closure can be readily stated under normal conditions. However, cuts shall never be made through the branch collar. Slab cuts and rip cuts will result in cancellation of the contract.
4. Pruning performed on this project shall include the provision of proper clearance over street, walkway, and woodland path surfaces to at least the following minimum specifications:
 - b. Street/Roads – All branches shall be pruned to allow a minimum fifteen (15) foot clearance over street surface.
 - c. Sidewalk/Walkway/Paths – All branches shall be pruned to allow a minimum eight (8) foot clearance over walkway surfaces.
 - d. Building – All branches shall be pruned to allow a minimum of five (5) foot clearance away from buildings, or if possible ten (10) foot clearance where trees will not be severely disfigured due to crown reduction.
5. All limbs over two inches in diameter to be removed shall be precut to prevent splitting. Any branches that would injure the tree or other objects by falling shall be lowered to the ground by proper rigging and rope procedures.
6. Remove one of the two crossed or rubbing branches where practical so the removal will not leave large holes in the general outline of the tree.
7. On trees known to be diseased, tools are to be disinfected with alcohol after each cut between trees and where there is known to be a danger of transmitting the disease on tools.
8. Lateral branches as well as occasional branch suckers may be retained. Complete removal of secondary laterals and branch suckers resulting in the stripping of major limbs, shall not be permitted.

Shrub Pruning

Pruning of shrubs requires knowledge of the growth patterns and flowering times. Many types of shrubs will not require regular pruning as long as they were appropriately selected for their site. Within the Reservation, shrubs will generally need to be pruned for removal of dead, diseased, or damaged wood and/or rejuvenation or shaping of the plant

Pruning should always work to emphasize the natural form of the plant and the plant shall never be pruned into a shape such as a ball or cone. No shearing of shrubs should occur within the Reservation. Hand pruning is always preferred in order to maintain the natural character of the plant species. In order to ensure that flower buds are not removed during pruning, there is a general rule for the timing of pruning. Shrubs that flower before July should be pruned immediately upon completion of flowering and shrubs that flower after July should be pruned in the winter or early spring.

Pest and Disease Management

A certain level of plant pests and disease can be accepted in the Reservation. However some problems may get out of control and could eventually seriously affect whole sections of the Reservation. Any problem should be monitored and attempts should be made to manage it at a tolerable level. A description and control measures for all pest and disease problems possible in the Reservation is too lengthy for this document and will require the use of a professional with relevant horticultural practices to diagnose and treat these problems.

Successful management of pest and disease problems requires the knowledge of the symptoms and causes. Once the problem is diagnosed, a staff member or contractor properly trained in control measures should instigate a control program. Certain pest problems can be managed through cultural practices, but some cases may require the use of pesticides. Integrated pest management (IPM) should always be used to reduce the amount of pesticides used. Information on IPM techniques can be found at the University of Massachusetts Extension Office website. All pesticide application must be performed under Massachusetts Pesticide Control Act of 1978; all chemicals shall be approved by MWRA and the Conservation Commission and applications must be documented. In addition, Massachusetts pesticide law requires that all persons who apply pesticides in public areas must be in possession of a valid license or certification issued by the Massachusetts Department of Agricultural Resources.

Invasive Plant Management

Invasive plants are a particularly widespread problem throughout the Reservation and seriously affect the Reservation's appearance and health of the natural habitat. An invasive plant management program should be immediately implemented by the DCR. While it will be impossible to eradicate all of the invasive plants, the populations of these plants should be controlled to an acceptable level so that other areas of the site will remain ecologically balanced and relatively free of competitive invasive plants.

Control of invasive plants can be costly in terms of both time and money and priorities will need to be established. Some of the invasive plants present in the Reservation are more problematic than others. Tree of Heaven and Poison Ivy are examples of plants that should be a priority concern. Also invasive plants are most populous and visible to the public in Management Areas D and G so these two areas should be considered a high priority. Management Area D, with its mix of invasive plants, tree saplings, and native successional shrubs, should be considered an area of concern as this area was historically free of vegetation. In Management Area G, widespread invasive plants have displaced native plants.

Invasive plant species are generally defined as non-native plants that have aggressively invaded naturally occurring plant communities. Virtually every habitat within the Reservation contains one or more invasive plant species. Poison ivy, although not technically an invasive species, presents a management challenge within the site as it occurs as a low-growing groundcover and as a climbing vine that winds around trees and shrubs within both the upland and shoreline portions of the site. Invasive species removal will need to be followed by native vegetation replanting to assist with the future management of invasive species.

A brief description and identification guide of each of the known invasive and noxious plants in the Chestnut Hill Reservation is listed in the Appendix D along with maintenance options and biological, manual, and/or chemical controls. As with all maintenance, the control efforts must balance improvement of the natural community with the disruption caused by the management. In all recommendations, the VMP assumes it is always best to take the least environmentally damaging approach that will affect the desired control of an invasive or noxious plant. These control recommendations were derived from a number of sources and are listed in the bibliography.

Invasive Plant Species Control Guidelines

Invasive species control will require a number of techniques and a long term management and monitoring strategy:

- 1) Manual and mechanical techniques such as hand and tool pulling, hand cutting, mowing, girdling, brush-cutting, mulching, and tilling can be used to control some invasive plants, particularly for relatively small populations. But these techniques will usually not kill well-established and deep rooted plants. Regrowth will occur from stumps, underground rootstocks or creeping underground stems. Cutting alone often results in a greater number of sprouts or excessive branching. Non-chemical control of well-established, deep-rooted plants will require either digging up the entire root system (clearing and grubbing) or repeatedly cutting the top growth over several years.
- 2) For some species as Purple Loosestrife (*Lythrum salicaria*), biological control is an option. Other invasive plants present in the Reservation are being studied for biological controls, but none have proven feasible at this time.
- 3) Chemical control techniques involve the use of herbicides that kill or otherwise impair an individual's competitive ability. If dealt with early enough, invasive plant problems can often be eliminated by non-chemical methods. However as a last resort, an herbicide-based approach may be required to control an infestation that has become well established or widespread. With certain invasive species, control is almost impossible without the use of chemical herbicides. Application methods include foliar application by spraying, application to cuts in the stem or trunk, and undiluted application to cut stems and stumps.
- 4) Replant and re-seed areas of invasive species removal in order to promote a native understory. As with all new plantings, the replacement plants should be native and suited for the site conditions.
- 5) Conduct routine invasive species maintenance and monitoring. Follow-up removal of problematic species should be conducted on at least an annual basis.

Herbicides

The use of herbicides should be considered a last resort but is usually the most effective, and sometimes the only, method of controlling certain invasive plants that have become well established and widespread. Large amounts of energy can be contained in the roots of some invasive plants. These plants will continue to resprout and seed despite manual and mechanical techniques. The use, type, and extent of chemical herbicide control will be the decision of the DCR, along with permission from the Boston Conservation Commission and the MWRA. One effective method for the control of woody plants is manually cutting the plant followed by "painting" the herbicide on the cut stump. This usually prevents resprouting and eventually kills the plant. This minimizes the spread of the chemical as would occur with spraying and reduces the amount entering into the environment.

The herbicides most commonly used for control of invasive plants are glyphosate (found in Roundup, Accord, and Rodeo), and triclopyr (found in Ortho Brush-B-Gon, Garlon, and Crossbow). Chemically, glyphosate and triclopyr have different properties which are helpful in determining the appropriateness of their application. Both are systemics in which the chemical is absorbed into the plant foliage or stems. Although both glyphosate and triclopyr have low oral toxicity to humans and other animal, glyphosate is the least toxic. Care must be taken with both chemicals to avoid contact with plants that are to be retained.

Glyphosate is a broad spectrum herbicide meaning that it is capable of killing a road range of woody and herbaceous plants. When applied to foliage or stems, the chemical moves within the plant to growing points and roots where the chemical inhibits the synthesis of the amino acids needed for plant growth. Complete death of the plant typically takes two weeks. Treatment for woody plants is best in late summer or fall. Glyphosate is

only effective on its immediate application. The chemical is readily biodegraded by micro-organisms in the soil and thus does not persist in the environment. Glyphosate does not prevent seed germination. For invasive aquatic or shoreline plant control, the brand Rodeo should be used as it does not contain the surfactants typical in RoundUp products and is approved for aquatic use by EPA. Lack of a surfactant minimizes toxicity to fish and other aquatic organisms to a very low level.

Triclopyr is used primarily for the control of broadleaf woody and herbaceous plants but has no effect on grasses or sedges if applied at normal rates. Triclopyr has a more rapid effect on plant than glyphosate with death usually occurs within a few days of application. Triclopyr is also typically more effective in the control of many woody species. The chemical interferes with the normal expansion and division of plant cells. Unlike glyphosate, triclopyr could potentially leach into groundwater or run off into surface waters, especially if the chemical is over applied. The EPA has not approved triclopyr for aquatic vegetation.

Before any application of herbicide or any other pesticide is used, the DCR must first obtain approval from the MWRA and the Boston Conservation Commission. All applications must be documented and applied by a staff member or contractor with a Massachusetts pesticide license.

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Appendices

Appendix A: Management Plans

Appendix B: Overlook Planting Plan

Appendix C: Recommended Plant Species

Appendix D: Invasive and Noxious Plant Species Description, Site Location, and Control Measures

Appendix E: Massachusetts Prohibited Plant List

Appendix A Management Plans

The following plans illustrate some of the vegetation management priorities and recommendations from Chapter 2. The plan focuses on locations for existing and proposed plantings and lawns and areas for selective tree pruning, vista clearing, and invasive plant control as well as identifying items of high priority. Areas and locations for new tree, shrub, and groundcover plantings are for illustrative purposes only and serve only as potential ideas that should be explored further through a detailed planting plan study. Any new plantings should take into account site cultural conditions, visitor use, safety, appearance, natural environment enhancement, and available DCR resources for both installation and maintenance of plants.

Appendix B
Overlook Planting Plans

Appendix C

Recommended Plant Species

The following pages contain a listing of plant species recommended for new and replacement plants throughout the Reservation. The recommended Management Area for each plant is included. This list is meant to serve only as a guide and other plants should be considered based upon the conditions at the time of site design. Outside of Management Area B, a mostly native plant palette should be used.

The term “native plant” can be defined in many ways based on how it is applied. According to the Federal Native Plant Conservation Committee, a native plant is one “that occurs naturally in a particular region, state, ecosystem, and habitat without direct or indirect human actions¹.” Native species have evolved along with competing species, predators, and disease and tend to be in ecological balance with other native species². Thus they are adapted to and able to survive in their native environment and will not tend to spread or out compete with other native species. Any non-natives selected for use in the Reservation should not be listed in the most current Massachusetts Prohibited Plant List published by the Massachusetts Department of Agricultural Resources.

Many of these plants have a number of cultivars. Final plant selection should be based on the particular design situation, the planting area’s cultural and site conditions, desired plant form, and disease and pest resistance.

¹ Federal Native Plant Conservation Committee Memorandum of Understanding, 1994.

², Morse, Larry E, Jil M. Swearington, and John M. Randall. Roadside Use of Native Plants, Defining What is Native. U.S. Department of Transportation, Federal Highway Administration.

Trees

Scientific Name	Common Name	Exposure	Flower Time	Flower Color	Mature Size	Spacing	Management Area
<i>Acer rubrum</i>	Red Maple	Sun	-	-	60-75'	-	A,B,C,E,F,G,H,I,J
<i>Acer saccharum</i>	Sugar Maple	Sun	-	-	60-75'	-	A,B,C,E,F,G,H,I,J
<i>Amelanchier canadensis</i>	Shadblow Serviceberry	Sun or Shade	March	White	18-25'	-	A,G,H,I
<i>Cornus alternifolia</i>	Pagoda dogwood	Sun	May-June	White	20-30'	-	A,G,H,I
<i>Crataegus crusgalli</i>	Cockspur Hawthorn	Part Shade to Sun	June	White	25-30'	-	A,B,E,F,G,H,I
<i>Fagus grandifolia</i>	American Beech	Sun	-	-	75-100'	-	A,B,G,H,I
<i>Fraxinus pennsylvanica</i>	Green Ash	Sun	April	Green to reddish	50-60'	-	B,E,F,G,H,I,J
<i>Ilex opaca</i>	American Holly	Sun to Part Shade	May	Dull white	40-50'	-	A,B,G,H,I
<i>Juniperus virginiana</i>	Eastern Redcedar	Sun	-	-	40-50'	-	A,B,E,F,G,H,I
<i>Pinus strobus</i>	Eastern White Pine	Sun to Part Shade	-	-	50-80'	-	A,B,E,F,G,H,I
<i>Quercus coccinea</i>	Scarlet Oak	Sun to Part Shade	-	-	70-75'	-	A,B,C,E,F,G,H,I,J
<i>Quercus rubra</i>	Red Oak	Sun	-	-	80-100'	-	A,B,C,E,F,G,H,I,J
<i>Quercus palustris</i>	Pin Oak	Sun	-	-	60-70'	-	A,B,C,E,F,G,H,I,J
<i>Tilia americana</i>	Basswood	Sun to Part Shade	June	Pale yellow	60-80'	-	A,B,C,E,F,G,H,I,J

Shrubs and Groundcovers

Scientific Name	Common Name	Exposure	Flower Time	Flower Color	Mature Size	Spacing	Management Area
<i>Aronia arbutifolia</i>	Red Chokeberry	Sun to Part Shade	April-May	White	6-10'	4'	A,E,G,H,I
<i>Calycanthus floridus</i>	Common Sweetshrub	Sun to Shade	June-July	Maroon	6-9'	4'	A,B,E,F,G,H,I
<i>Clethra alnifolia</i>	Summersweet Clethra	Sun to Shade	July-August	White	3-8'	4'	A,B,E,FG,H,I
<i>Comptonia peregrina</i>	Sweetfern	Part Shade to Sun	April-May	Yellow-green	2-5'	18"	A,B,E,F,G,H,I
<i>Cornus amomum</i>	Silky Dogwood	Sun to Shade	May-June	Yellowish white	6-10'	5'	A,B,E,G,H,I
<i>Cornus racemosa</i>	Gray Dogwood	Sun to Shade	May-June	Whitish	10-15'	5'	A,B,E,G,H,I
<i>Hamamelis virginiana</i>	Common Witchhazel	Part Shade to Sun	November	Yellow	15' (20-30')	6'	A,B,E,G,H,I
<i>Ilex glabra</i>	Inkberry	Sun to Shade	May-June	Cream	6-8'	3'	A,B,E,F,G,H,I
<i>Ilex verticillata</i>	Common Winterberry	Sun to Part Shade	June	White	6-10'	4'	A,B,E,F,G,H,I
<i>Juniperus horizontalis</i>	Creeping Juniper	Sun	-	-	varies	varies	B
<i>Kalmia latifolia</i>	Mountain Laurel	Part Shade to Shade	June	white to pink	6-20'	4'	A,B,E,F,G,H,I
<i>Lindera benzoin</i>	Spicebush	Part Shade to Sun	April	Yellow	6-12'	5'	A,B,E,F,G,H,I
<i>Myrica pensylvanica</i>	Northern Bayberry	Sun to Part Shade	-	-	5-12'	4'	B,E,F
<i>Potentilla fruticosa</i>	Bush Cinquefoil	Sun to Part Shade	June- frost	Yellow	1-4'	3'	A,B,E,F,G,H,I

Scientific Name	Common Name	Exposure	Flower Time	Flower Color	Mature Size	Spacing	Management Area
Rhododendron calendulaceum	Flame Azalea	Part Shade to Sun	May-June	varies	4-10'	4'	A,B,E,F,G,H,I
Rhododendron maximum	Rosebay Rhododendron	Part Shade	June-July	Pinkish	15-30'	5'	A,B,E,F,G,H,I
Rhododendron periclymenoides	Pinxterbloom Azalea	Part Shade to Sun	April-May	varies	4-6'	4'	A,B,E,F,G,H,I
Rhododendron viscosum	Swamp Azalea	Sun to Shade	July	White	6-12'	4'	A,B,E,F,G,H,I
Rhus aromatica	Fragrant Sumac	Part Shade to Sun	March-April	Yellowish	2-6'	4'	A,B,E,F,G,H,I
Symphoricarpos albus	Common Snowberry	Sun to Shade	June	Pinkish	3-6'	4'	A,B,E,F,G,H,I
Vaccinium angustifolium	Lowbush Blueberry	Sun to Part Shade	-	-	18"	-	A,B,E,G,H
Viburnum acerifolium	Mapleleaf Viburnum	Part Shade to Shade	June	Yellowish white	3-6'	4'	A,B,E,F,G,H,I
Viburnum cassinoides	Witherod	Part Shade to Shade	June	White	6-12'	4'	A,B,E,F,G,H
Viburnum dentatum	Arrowwood Viburnum	Sun to Shade	May-June	White	6-12'	5'	A,B,E,F,G,H,I
Viburnum prunifolium	Blackhaw Viburnum	Sun to Shade	May	White	12-15'	6'	A,B,E,F,G,H
Viburnum trilobum	American Cranberrybush Viburnum	Sun to Shade	May-June	White	6-12'	5'	A,B,E,F,G,H,I
Xanthoriza simplicissima	Yellowroot	Sun to Shade	March-April	Brownish purple	2-3'	30"	A,B,E,F,G,H,I

Ferns

Scientific Name	Common Name	Exposure	Flower Time	Flower Color	Mature Size	Spacing	Management Area
Dryopteris marginalis	Marginal Wood Fern	Shade	-	-	1-2'	2'	A,G,H
Onoclea sensibilis	Sensitive Fern	Sun to Part Shade	-	-	18-24"	18"	A,G,H
Osmunda cinnamomea	Cinnamon Fern	Part Shade to Shade	-	-	2-3'	2'	A,G,H
Polystichum acrostichoides	Christmas Fern	Sun to Part Shade	-	-	2-3'	1'	A,G,H

Perennials

Scientific Name	Common Name	Exposure	Flower Time	Flower Color	Mature Size	Spacing	Management Area
Anemone quinquefolia	Wood Anemone	Shade	April-June	white	4-8"	8"	A,G,H
Aquilegia canadensis	Wild Red Columbine	Sun to Part Shade	April-July	red and yellow	1-2'	1'	A,G,H
Aster cordifolius	Heart-leaved Aster	Sun to Shade	Aug-Nov	blue purple	1-4'	18"	A,G,H
Aster divaricatus	White Wood Aster	Part Shade to Shade	Aug-Oct	white	1-3'	18"	A,G,H
Geranium maculatum	Wild Geranium	Part Shade	April-June	lavender	1-2'	18"	A,G,H
Polygonatum pubescens	Solomons Seal	Shade	May-June	yellow-green	1-3'	1'	A,G,H

Images of Select Recommended Plant Species



Red Maple



Red Oak



Sugar Maple



Eastern Red Cedar



Eastern White Pine



Swamp Azalea



Fragrant Sumac



Flame Azalea



Summersweet Clethra



Pinxterbloom Azalea



Mapleleaf Viburnum



Arrowwood Viburnum



Witherod



American Cranberrybush Viburnum



Mountain Laurel



Rosebay Rhododendron



Gray Dogwood



Red Chokeberry



Inkberry



Basswood



Winterberry



Spicebush



Sweetfern



Common Witchhazel



Hayscented Fern



Yellowroot



Marginal Wood Fern



Wild Red Columbine



Wild Geranium



Wood Anemone



White Wood Aster



Solomons Seal

Appendix D

Invasive and Noxious Plant Species Description, Site Location, and Control Measures

Black Locust (*Robinia pseudoacacia*)

Description:

Black Locust is a rapidly growing, early successional, deciduous tree native to the southeastern United States. It is best identified by its thorny branches and alternate, compound leaves which are 8 to 12 inches long with 7 to 19 rounded leaflets. This tree is capable of growing up to 80 feet tall. Once introduced into an area, Black Locust expands rapidly, creating dense stands of clones which shade native ground vegetation. The large, fragrant blossoms of black locust compete with native plants for pollination by bees and other insects. Although abundant seeds are produced, few actually germinate. Black Locust is intolerant of shade and is not found in dense woods except as a dominant tree. Although Black Locust is native to parts of North America, it is not native to New England.



Black Locust

Site Location:

Scattered Black Locust saplings were observed within Management Area D (reservoir shoreline). It is probably also present in Management Area G. In Management Area D, this tree is a problem since it, along with the other plants, blocks views to the reservoir and is a constant maintenance problem requiring annual trimming.

Control Measures:

Biological control agents are not available to check the invasion of black locust. Manual cutting or removal of the trees alone is also not an effective maintenance option due to the plant's strong re-sprouting ability. Seedlings may be hand-pulled if the entire root system is removed. In order to effectively discourage the growth and dispersion of black locust, a combination of manual cutting and removal combined with a comprehensive chemical treatment of the stumps and shoots is the most effective control measure. A direct application of glyphosate or triclopyr solution applied to fully expanded leaves or stumps cut near the ground is typically recommended. Triclopyr is typically more effective.

European and Glossy Buckthorn (*Rhamnus cathartica*, *Rhamnus frangula*)

Description:

European buckthorn and glossy buckthorn are invasive, deciduous shrubs native to Eurasia and first introduced into the United States prior to 1800 as an ornamental hedge planting. Typically this plant is six to nine feet tall at maturity, occasionally reaching 25 feet. It can be identified with its oblong to elliptical toothed leaves with sharp thorns at the tips of branches. In late summer to early spring, this plant bears purple-black berries. European buckthorn is well established in New England and rapidly spreading westward. Glossy buckthorn is an aggressive invader of wet soils, capable of growing in both full sun and heavily shaded conditions. European buckthorn also grows well in a wide variety of upland habitats, including old fields and roadsides. Both species of buckthorn are a nuisance species that aggressively out-competes native flora and can form large colonies. Under full-sun conditions, young individual plants can produce seed in only a few years. In heavily shaded habitats, seed production may be significantly delayed. The black fruits are effectively dispersed by a variety of birds and mice.



European Buckthorn

Site Location:

Clusters of buckthorn were frequently observed within Management Areas A, D, and G. In woodland areas, this plant has displaced native species. In Management Area D, this plant is a problem since it, along with the other plants, blocks views to the reservoir and is a constant maintenance problem requiring annual trimming.

Control Measures:

No effective biological controls of European or glossy buckthorn that are feasible are known at this time. Buckthorn seedlings and rootstock can be manually removed. For larger plants, the stems should be cut at least twice in one season (June and August). This treatment repeated for 2 or 4 successive years may control the plant. Painting the cut stumps with undiluted glyphosate or triclopyr will speed the eradication process. As buckthorns tend to hold their foliage longer than other plants in the fall, a mid to late fall foliar application of glyphosate solution is typically effective and reduces the chances of injuring other plants. Because plants that appear to have been killed can resprout even several years after treatment with herbicide, annual monitoring should be conducted and follow-up treatments made as needed.

Garlic Mustard (*Alliaria officinalis*)

Description:

Native to Europe, this biennial wildflower (e.g. seeds over-winter prior to germination) tends to grow in woodlands and floodplains, where it out-competes native herbaceous plants. The plant can self-pollinate, and seed germination is prolific, starting earlier in spring (late February/early March) than most native wildflowers. Plant growth may extend into the winter months provided temperatures are above freezing and there is no snow cover. Garlic mustard spreads from established patches of infestation along an invasion front. Satellite

infestations occur when seeds are transported by wind or wildlife into new areas, most often along trails, roads or forest edges. It is a severe threat to many natural areas where it occurs because of its ability to grow to the exclusion of other herbaceous species.



Garlic Mustard

Site Location:

Scattered patches of garlic mustard were observed throughout the forested portions of the property (Management Areas A, G, and H) where it out competes other herbaceous vegetation.

Control Measures:

Biological control of garlic mustard is being explored by a consortium coordinated through Cornell University and numerous state and federal partners. To date, an effective biological control agent that feeds exclusively on garlic mustard has not been identified. Removing individual garlic mustard plants manually is the simplest and most cost effective approach to maintaining small or isolated infestations. When pulling plants, it is important to remove the stem as well as the entire root system, since buds located within the root crown can produce additional stems. All pulled plants should be removed from the site as seed ripening continues even after plants are pulled. Care should be taken to minimize soil disturbance but to remove all root tissues. Soil disturbance can bring garlic mustard seeds to the surface, thus creating a favorable environment for their germination. To avoid this, soil should be tamped down firmly after removing the plant. Re-sprouting is uncommon but may occur from mature plants not entirely removed. Repeated hand pulling of garlic mustard is reported to be effective for control in small areas, but has limitations and is labor intensive. Specifically, seeds remain viable in the soil for up to five years so it is necessary to remove all garlic mustard in an area every year until the seed bank is exhausted and seedlings no longer appear. This will require multiple efforts each year as rosettes can continue to bolt and produce flowers over an extended period (April-June). Accordingly, manual garlic mustard removal should be part of the long-term maintenance.

For large populations of garlic mustard, cutting may be a viable option. The stems should only be cut when in flower (in late spring or early summer) down to ground level using a string trimmer. Cut stems should be immediately removed to prevent maturing of seeds. An annual program of trimming should continue until the seedbank is depleted.

Multiflora Rose (*Rosa multiflora*)

Description:

Multiflora Rose is a prolific shrub with thorny, arching stems known as canes. It is capable of reaching a height of ten feet. Leaves are composed of five to ten one-inch long leaflets. Clusters of single, white flowers appear in June followed by small red hips in August. Multiflora Rose tends to form into dense thickets. This shrub was introduced to the east coast of the United States from Japan and commonly used as a conservation and ornamental landscape plant. Multiflora Rose tolerates a variety of soil and light conditions and spreads primarily through seeds consumed by birds. An individual plant may produce up to 1 million seeds per year which can remain dormant in the soil for up to 20 years. The plant can also root from the canes that contact the soil surface. The plant spread quickly once established, growing up to 1 to 2 feet per week.



Multiflora Rose

Site Location:

Multiflora Rose was observed in Management Areas A, D, and G. It has formed into several dense thickets in several areas and displaces other vegetation. Its thorny branches may be problematic near pedestrian areas. In Management Area D, this plant is a problem since it, along with the other plants, blocks views to the reservoir and is a constant maintenance problem requiring annual trimming. As this plant was commonly planted for its ornamental value, it may have been intentionally planted here in the past.

Control Measures:

No effective biological controls that prohibit Multiflora Rose growth are known at this time. Rose rosette disease is a sometimes fatal viral disease that attacks Multiflora Rose; however, this disease is not considered an effective biological control because it may infect other rose species, as well as apple trees, plum trees, and some types of berries. The spread of Multiflora Rose can be hindered by repeated cutting during the growing season. All stems should be cut, and new stems that appear should also be removed in the same growing season. This treatment will most likely need to be repeated for several years to achieve adequate control. Hand cutting is difficult due to the thorns and long stems. Painting the cut stumps with undiluted glyphosate or triclopyr will speed the eradication process but is difficult given the large number of branches. A foliar application of glyphosate is best applied after flowering (early summer) to early fall. A foliar application of triclopyr is best applied in spring before and during flowering. In large areas of Multiflora Rose, repeated mowing three to six times a year has proved effective.

Because plants that appear to have been killed can resprout even several years after treatment with herbicide, annual monitoring should be conducted and follow-up treatments made as needed.

Norway Maple (*Acer platanoides*)

Description:

Norway Maple is a fast-growing tree, highly tolerant to variations in environmental conditions, including soil type and moisture regime. It often outcompetes other native deciduous trees. Its thick foliage tends to over-shade the understory and groundcover layers, stressing native shrubs and herbs. Shade tolerant, the seedlings quickly take over understory areas.

It is often overlooked due to its resemblance to Sugar Maple (*Acer saccharinum*) and has been planted extensively as an ornamental tree. Native to continental Europe, this tree spread south from Norway, and was likely introduced to North America in the mid 1700's. Norway Maples, unlike similar maples, exude a milky sap from the end of its leafstalks when broken. Norway Maple seeds are typically flatter than Sugar or Red Maples.



Norway Maple

Site Location:

Scattered Norway maples were observed in Management Areas A and I. Although this tree is not a major problem in the Reservation now and has become part of the wooded overstory, the invasive and quick growing nature of seedlings from the mature trees may become a threat in the future. Mature trees are also a seed source that could spread seed into adjacent properties. Since this tree was extensively planted in the past, it may have been intentionally planted here at one time.

Control Measures:

Biological control agents are not available to check the invasion of Norway maple. Large areas of seedlings, if they occur, can be controlled with mowing. Manual cutting or removal of large trees alone is also not an effective maintenance option as it quickly resprouts. In order to effectively discourage the growth and dispersion of Norway maple, a combination of manual cutting and removal combined with a comprehensive chemical treatment of the stumps and shoots is the most effective means of maintaining this invasive species. A direct application of glyphosate solution applied to the foliage or stumps cut near the ground is recommended.

Oriental Bittersweet (*Celastrus obiculatus*)

Description:

Oriental Bittersweet is a deciduous invasive non-native woody vine that has a twining or trailing growth pattern. Vines can grow to over five inches in diameter and over 60 feet long. The leaves are oval to nearly round with a yellow fall color. Copious amounts of bright yellow to red berries cover the plant from late summer to late fall. Berry-covered branches are commonly used in dried arrangements. Native to eastern Asia, Japan, Korea and China, Oriental Bittersweet was first introduced into the United States in the 1860s. Oriental Bittersweet typically prefers roadsides, hedgerows and thickets, but its shade tolerance has allowed it to spread into forested areas. It reproduces by seeds, stolons, rhizomes, and root suckers. Dense stands of vines can shade and suppress native vegetation. Tree and shrub stems are weakened and killed by the twining and climbing growth which twists around and eventually constricts solute flow. Trees with girdled stems and large amounts of vine biomass in their canopies are more susceptible to damage by wind, snow and ice storms.



Oriental Bittersweet

Site Location: Oriental Bittersweet vines were observed entwined amongst the upland mature and sapling trees in Management Areas A, G and H. This plant is a particular problem due to its twining habit leading to premature damage and death to trees.

Control Measures:

No effective biological controls that prohibit Oriental Bittersweet growth are known at this time. For manual removal, the vines should be cut as close to the ground as possible. Frequent recutting of the sprouts will be required until the energy in the rootstock is exhausted. Grubbing of the rootstock and runners by a pulaski or similar tool is recommended.

Oriental Bittersweet is best treated with triclopyr as it is fairly tolerant of glyphosate. As the plant is usually intertwined in trees, the vine should be manually cut and the stump painted with undiluted triclopyr. The vine is persistent and repeated applications may be needed if resprouting occurs.

Poison Ivy (*Toxicodendron radicans*)

Description:

Initial establishment of Poison Ivy is generally by seed that is transported by birds. The plant normally has shiny leaves composed three leaflets but may vary from groups of three to nine leaflets. Leaves have an intense red color in the fall with yellow or green flowers and white berries. The single-seeded fruit are eaten by a

variety of birds and the fruit is dispersed by birds after passing through their digestive tract. Once established, the plant continues to spread by producing shoots from its extensive underground stems (rhizomes). The plant is spread by creeping rootstocks that extend from the parent plant. New plants can sprout from a small, buried root section that escapes cultural control attempts. Poison ivy can both grow as a creeping groundcover and a climbing vine. Like Oriental Bittersweet, Poison Ivy vines can girdle trees branches and weigh down the entire tree making the tree susceptible to wind, snow, and ice damage.



Poison Ivy

Site Location:

Poison Ivy was an observed groundcover species around the perimeter of the Reservoir (Management Area D) and as both climbing vines and groundcover within the upland portions of the site (Management Areas A, E, F, G, and H). On the walkways along the south side of Chestnut Hill Driveway, Poison Ivy is often hanging down from trees directly in the path of pedestrians. It is also a particular problem in the wooded area adjacent to the Chestnut Hill Reservoir Gardens as both a ground cover and vine covering trees.

Efforts towards control and removal should be directed in areas adjacent to pathways and other pedestrian areas. As the plant is very fast growing, plants should be trimmed and removed a minimum of eight to ten feet from the edge of any pedestrian area. Repeated trimming and removal should occur on at least an annual basis.

Control Measures:

Since Poison Ivy is not a listed invasive species, a feasible option is to leave the plants undisturbed and post signage warning visitors of Poison Ivy exposure. Poison Ivy is a native species to New England and therefore its natural control agents are already present. Consequently, biological control is not an option for the control of poison ivy. Burning this invasive species to remove it from an area is never recommended for the control of poison ivy, as it creates a serious health hazard and does not effectively reduce infestations. Due to the prevalence of Poison Ivy within the site combined with the public hazards it presents, control of this species is likely best accomplished with the complete manual removal of the plant followed by periodic chemical applications and monitoring. Caution must be taken to avoid skin contact with any part of the poison ivy plant or its oils that may contaminate clothing. The oil of the plant, which causes the rash, can remain on all parts of the plant, including the woody stem, throughout the year.

In order to effectively eradicate Poison Ivy utilizing the manual removal method, the entire plant must be removed. When the soil is wet, the roots should be dug up and removed completely from the soil as any root sections left will sprout. Manually removing the roots and stems will diminish the ability of the plant to produce shoots will be minimized. Repeated cultivation will eventually eliminate poison ivy because the plant

does not regenerate easily from plant fragments. Climbing vines of Poison Ivy, like those found within the upland sections of the site, can be cut and pulled from the trees, fence posts, and other structures. Manual removal of Poison Ivy should be best accomplished in the winter when the plants are dormant reducing the risk of exposure. Poison Ivy clippings and roots should be transported from the site and disposed of properly.

Another option available to remove Poison Ivy includes chemical application of glyphosate. Leaves can be selectively painted with the solution using a disposable brush or cotton rag and spot treatment will minimize the chance of the herbicide drifting onto adjacent, desirable vegetation. Larger areas of Poison Ivy are best handled with foliar spraying of glyphosate. Repeated applications of herbicide may be necessary due to the aggressive nature of this plant.

Common Pokeweed (*Phytolacca americana* L.)

Description:

Common Pokeweed is a native of North America but has weedy qualities and contains a high level of toxins throughout the plant that can harm humans and animals but only if internally ingested. The plant is a tall perennial that grows from a thick, fleshy root. Pokeweed has a stout, smooth, hollow, purplish stem that is extensively branched and attains a height of 2 to 8 feet. Leaves can be large (10 inches long) and are ovate-shaped and dark green. The fruit develops into large, lens shaped, glossy dark purple or black berries. Birds eat the berries and scatter the seeds.

Once Common Pokeweed becomes established, it regrows each year from a large, fleshy taproot. Additionally, plants can produce anywhere from a few thousand seeds to over 48,000 seeds per plant. Seeds can remain viable in the soil for over 40 years.



Common Pokeweed

Site Location:

Several scattered populations of Common Pokeweed were observed at the sunny bottom of the slopes in Management Area G. It does not seem that Pokeweed is a major problem to the historic landscape or the current use of the Reservation but its population should be monitored. Toxins in this plant will only affect someone if the plant is directly ingested. The weedy character of this plant may be seen to some as unattractive.

Control Measures:

If only a few plants occur in an area, pull them up with the entire root system intact and dispose of them off-site. Spot applications of glyphosate can severely injure or kill the plant. Since pokeweed is a perennial with energy stored in its large taproot, a single herbicide application will probably not provide acceptable control and will require repeated treatments.

Porcelain Berry (*Ampelopsis brevipedunculata*)**Description:**

Porcelain Berry is a deciduous, woody, perennial vine native to China, Korea, and Japan. It twines with the help of non-adhesive tendrils that occur opposite the leaves and closely resembles native grapes in the genus *Vitis*. The stem pith of porcelain-berry is white (grape is brown) and continuous across the nodes (grape is not), the bark has lenticels (grape does not), and the bark does not peel (grape bark peels or shreds). The leaves are alternate, broadly ovate with a heart-shaped base, palmately 3-5 lobed or more deeply dissected, and have coarsely toothed margins. Fruits appear in September and October and are colorful, changing from pale lilac, to green, to a bright blue.

Porcelain Berry spreads by seed and through vegetative means. The colorful fruits, each with two to four seeds, attract birds and other small animals that eat the berries and disperse the seeds in their droppings. The taproot of porcelain-berry is large and vigorous. Resprouting will occur in response to cutting of above-ground portions. Porcelain Berry vines can grow up to 15 ft. in a single growing season, especially when rainfall is abundant, and seed may be viable in the soil for several years.



Porcelain Berry

Site Location:

Porcelain berry was observed at the bottom of the slopes in Management Area G in scattered but dense pockets and scattered along the top of the rip rap in Management Area D. This plant may have been intentionally planted as part of the historic landscape. In Management Area G, it does not seem that Porcelain Berry is a major problem to the historic landscape or the current use of the Reservation but its population should be monitored and controlled if it starts to spread. In Management Area D, this plant is a problem since it, along with the other plants, blocks views to the reservoir and is a constant maintenance problem requiring annual trimming.

Control Measures:

Hand pulling of vines in the fall or spring will prevent flower buds from forming the following season. Where feasible, plants should be pulled up by hand before fruiting to prevent the production and dispersal of seeds. If the plants are pulled while in fruit, the fruits should be bagged and disposed of in a landfill. For vines too large to pull out, cut them near the ground and either treat cut stems with undiluted glyphosate or triclopyr or repeated cutting of regrowth as needed. For large infestations, a foliar application may be used. The most effective control has been achieved using triclopyr. From summer to fall, cut plants first and allow time for regrowth and then apply the herbicide.

Purple Loosestrife (*Lythrum salicaria*)

Description:

Purple Loosestrife is a perennial, herbaceous wetland species native to much of the world, including Europe and Asia, which was introduced to the northeastern United States and Canada in the 1800s for ornamental and medicinal purposes. The plant is best identified by its long spikes of purple flowers that occur from June to September. It can grow to be six to ten feet tall. Leaves are lance-shaped. This species aggressively out-competes and displaces native wetland vegetation, reducing biological diversity, and degrades the quality of wildlife habitats. This species has quickly invaded much of North America and has no natural predators or diseases that would normally limit its success in the northeast region. Purple Loosestrife produces copious amounts of seeds, up to 250,000 seeds per plant annually, and possesses a strong taproot that continues to provide food to the plant when it is mowed, sprayed with herbicides, or damaged by insects.



Purple Loosestrife

Site Location:

There is a large Purple Loosestrife colony in the shallow water below the rip-rap on the western side of the reservoir (Management Area D). It seems that the Purple Loosestrife is mostly confined to this area since other areas of the reservoir are probably too deep for the spread of this plant.

Control Measures:

A biological control has been effectively used in the control of Purple Loosestrife. Galerucella beetles (*Galerucella calmariensis* and *G. pusilla*) are two species that specifically targets purple loosestrife and feeds on the leaves, shoots, and stems to defoliate these invasive plants. Though an exotic species themselves, the use of Galerucella beetles as a biological control has proven effective, with a success rate of up to 90% in other areas of North America without visible environmental repercussions. The United States Department of Agriculture–Animal Plant Health Inspection Service has approved the release of Galerucella for purple loosestrife control and the beetles have been released in over 30 states. Massachusetts has been using them effectively since 2000.

Adults inflict a shothole feeding pattern eating small holes through foliage. Adult and larval feeding upon the buds results in stunted plants and reduced seed production. Larval damage to flower and shoot buds reduces plant growth and inhibits flowering. Adult and larval leaf damage greatly reduces the photosynthetic capability of *L. salicaria*, possibly leading to reduced starch stores in the roots which can result in winter plant mortality. Photosynthetic inhibition results in reduced stem height and root length, both essential to overall plant vigor.

With heavy defoliation, the host plant becomes skeletonized and turns brown. Heavily defoliated plants may die or produce fewer shoots the following year. The resultant weakening and/or death of the loosestrife plants provide an opportunity for previously out-competed native plant species to return.

Two species of weevils, *Hylobius transversovittatus* and *Nanophyes marmoratus*, also feed on Purple Loosestrife and may provide an effective biological control measure.

Manual removal and chemical applications of herbicide to control purple loosestrife is generally considered an ineffective means of removal given the prolific seed production and extent of the root system and the plants associated ability to flourish and germinate. Any attempt at manual removal should include the removal of as much of the rootstock as possible. Removal should occur before flowering to prevent distribution of the prolific seeds. All plant parts should be bagged and disposed in an approved landfill or preferably burned. The herbicide Rodeo (a form of glyphosate approved for use in aquatic habitats) is the best option for chemical control.

Tree-of-Heaven (*Ailanthus altissima*)

Description:

Tree of Heaven, also commonly known as Chinese Sumac or simply Ailanthus, is a persistent and aggressive weed throughout much of Europe and North America. Ailanthus grows quickly and can reach a height of eight feet in its first year. Ultimately these trees can reach 80 to 100 feet in height. It has smooth gray bark and one to three foot long leaves composed of twelve to thirty leaflets, closely resembling Staghorn Sumac leaves. Different from sumac, the leaflets usually have one to four small round glands on their undersides that produce a foul smell. It flowers in late May through early June and may produce several hundred flowers each year, each of which forms clusters containing hundreds of seeds. Single trees may produce up to 350,000 seeds in one year. Seeds are small, easily dispersed by wind, and mostly viable. Trees also reproduce readily via root sprouts that can emerge up to 50 feet from the nearest trunk and readily forms into extensive and dense thickets which displace and shade out other vegetation. It is a ready colonizer of disturbed sites both in urban and natural areas but is usually intolerant of full shade. Once established, its primary mode of reproduction is through root suckers.



Tree of Heaven

Site Location:

Several large patches of Tree of Heaven exist in Management Area G and infrequently observed in the rip-rap in Management Area D. In one area, a group of these trees were cut down in the fall of 2006; however the DCR

should monitor the area for aggressive re-sprouting which will possibly occur in the spring. As this plant easily out competes and displaces other plants and blocks views, the DCR should strive to completely remove all Tree of Heaven plants from the Reservation.

Control Measures:

No effective biological controls of ailanthus that are feasible are known at this time. Young seedlings of ailanthus can be pulled by hand, but they develop a significant taproot within 3 months and then become very difficult to remove. Thus, plants should be pulled as soon as they are large enough to grasp. Seedlings are best pulled after a rain when the soil is loose. The entire root must be removed since broken fragments may re-sprout.

Larger trees may be cut at ground level with power or manual saws. Cutting is most effective when trees have begun to flower in late spring to prevent seed production. Because ailanthus spreads by suckering, aggressive re-sprouts are common after treatment. Two cuttings per year may be necessary, one early in the growing season and one late in the growing season. Although plants may not be killed after cutting, seed production will be inhibited and vigor will be reduced. If continued for several years, plants will be severely stressed by cutting and will eventually be killed. Painting the stumps with undiluted glyphosate or triclopyr will speed the eradication process. Foliar herbicide treatment is another option to control re-sprouts.

Girdling of the bark can be used for large trees. Using a hand-axe, make a cut through the bark approximately 6 inches above the ground, and cut completely around the trunk. Be sure that the cut goes well into or below the cambium layer. This method will kill the top of the tree but re-sprouts are common, and may require follow-up treatments for several years.

Winged euonymus, Burning Bush (*Euonymus alatus*)

Description:

Winged Euonymus, also known as Burning Bush, is a common ornamental landscape plant that is still planted mainly for its bright red fall foliage and unique corky wings on its branches. Native to China and Japan, this fast growing plant can reach a height of 15 to 20 feet. Leaves are one to three inches long and ½" to 1 ½" wide with marginal serrations. In fall the leaves turn from a purplish-red to scarlet before dropping. Fruiting occurs in September and October which are feasted upon by birds, a principal means of seed dispersal. Germination of seeds also readily occurs underneath the mother plant. The plant is adaptable to a number of environmental conditions and out-competes native species in both open woodlands and fields. It has recently started to show up on its own in many areas of Massachusetts.



Winged Euonymus

Massachusetts now considers Winged Euonymus an invasive species and has been placed on the Massachusetts Prohibited Plant List. It will be prohibited for sale or distribution by January 1, 2009.

Site Location:

Small populations of Winged Euonymus were observed at the bottom of the slopes in Management Area G and scattered in the wooded area of Management Area A. Although this plant may have been intentionally planted at the Reservation, the existing locations of the Winged Euonymus seem to indicate it may have spread here from elsewhere. It is probably not a threat to the historic landscape or current use at this time; however the plants should be monitored to avoid additional spread. Existing plants do provide seeds that can be spread to other properties by birds.

Control Measures:

No effective biological controls of Winged Euonymus that are feasible are known at this time. Control of this plant is difficult because it produces a tremendous amount of seed. Seedlings up to 2 feet tall can be easily hand-pulled, especially when the soil is moist. Larger plants and their root systems can be dug out with a spading fork or pulled with a weed wrench. Larger shrubs can be cut. The stump must be ground out or the re-growth clipped. The cut stump can also be painted with undiluted glyphosate or triclopyr immediately after cutting. Where populations are so large that cutting is impractical, glyphosate or triclopyr may be applied as a foliar spray. This is most effective during the early summer months. An extremely labor intensive method to prevent spread, while keeping the original plant, is to trim off all the flowers prior to seed formation.

Appendix D Sources

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Appendix E Massachusetts Prohibited Plant List

Massachusetts Prohibited Plant List

With links (common name) to Invasive Plant Atlas of New England (IPANE)

****Effective January 1, 2006:** The importation of the plants listed below are banned by the listed [**importation ban**] date. The one and three year propagation ban phase-out dates listed -are allowed only on plants that have entered the state *prior to the listed importation ban date* and remain in the channels of trade within the Commonwealth.

Latin	Common	Importation Ban	Propagation Ban
Acer platanoides	Norway maple	July 1, 2006	January 1, 2009
Acer pseudoplatanus	Sycamore maple	July 1, 2006	January 1, 2009
Aeginetia		January 1, 2006	January 1, 2006
Aegopodium podagraria	Bishop's goutweed; bishop's weed; goutweed	July 1, 2006	January 1, 2009
Ageratina adenophora	crofton weed	January 1, 2006	January 1, 2006
Ailanthus altissima	Tree of Heaven	January 1, 2006	January 1, 2006
Alectra Thunb.		January 1, 2006	January 1, 2006
Alliaria petiolata	Garlic mustard	January 1, 2006	January 1, 2006
Alternanthera sessilis	Sessile joyweed	January 1, 2006	January 1, 2006
Ampelopsis brevipedunculata	Porcelain-berry; Amur peppervine	January 1, 2006	January 1, 2006
Anthriscus sylvestris	Wild chervil	January 1, 2006	January 1, 2006
Arthraxon hispidus	Hairy joint grass; jointhead; small carpetgrass	January 1, 2006	January 1, 2006
Asphodelus fistulosus	onion weed	January 1, 2006	January 1, 2006
Avena sterilis	animated oat	January 1, 2006	January 1, 2006
Azolla pinnata	mosquito fern	January 1, 2006	January 1, 2006
Berberis thunbergii	Japanese Barberry	July 1, 2006	January 1, 2009
Berberis vulgaris	Common barberry; European barberry	January 1, 2006	January 1, 2006
Cabomba caroliniana	Carolina Fanwort; fanwort	January 1, 2006	January 1, 2006

Cardamine impatiens	Bushy rock-cress; narrowleaf bittercress	January 1, 2006	January 1, 2006
Carex kobomugi	Japanese sedge; Asiatic sand sedge	January 1, 2006	January 1, 2006
Carthamus oxyacantha Bieb.	wild safflower	January 1, 2006	January 1, 2006
Caulerpa taxifolia		January 1, 2006	January 1, 2006
Celastrus orbiculatus	Oriental bitterweet; Asian or Asiatic bitterweet	January 1, 2006	January 1, 2006
Centaurea biebersteinii	Spotted knapweed	January 1, 2006	January 1, 2006
Chrysopogon aciculatus	pilipiliula	January 1, 2006	January 1, 2006
Commelina benghalensis	Benghal dayflower	January 1, 2006	January 1, 2006
Crupina vulgaris	common crupina	January 1, 2006	January 1, 2006
Cuscuta	Dodder	January 1, 2006	January 1, 2006
Cynanchum louiseae	Black Swallow-wort; Louise's swallow-wort; Autumn olive	January 1, 2006	January 1, 2006
Cynanchum rossicum	European swallow-wort; pale	January 1, 2006	January 1, 2006
Digitaria abyssinica		January 1, 2006	January 1, 2006
Digitaria scalarum	African couch grass	January 1, 2006	January 1, 2006
Digitaria velutina	velvet fingergrass	January 1, 2006	January 1, 2006
Drymaria arenarioides	alfombrilla	January 1, 2006	January 1, 2006
Egeria densa	Brazilian waterweed; Brazilian eloda	January 1, 2006	January 1, 2006
Eichhornia azurea	anchored waterhyacinth	January 1, 2006	January 1, 2006
Elaeagnus umbellata	Autumn Olive	January 1, 2006	January 1, 2006
Emex australis	three-cornered jack	January 1, 2006	January 1, 2006
Emex spinosa	devil's thorn	January 1, 2006	January 1, 2006
Epilobium hirsutum	Hairy willow-herb; Codlins and Cream	January 1, 2006	January 1, 2006
Euonymus alatus	Winged euonymus; Burning Bush	July 1, 2006	January 1, 2009
Euphorbia esula	Leafy Spurge; Wolf's Milk	January 1, 2006	January 1, 2006
Euphorbia cyparissias	Cypress spurge	January 1, 2006	January 1, 2006
Festuca filiformis	Hair fescue; fineleaf sheep fescue	January 1, 2006	January 1, 2006

Frangula alnus	European buckthorn; glossy buckthorn	January 1, 2006	January 1, 2006
Galega officinalis	goatsrue	January 1, 2006	January 1, 2006
Glaucium flavum	Sea or horned poppy; yellow horn poppy	January 1, 2006	January 1, 2006
Glyceria maxima	Tall mannagrass; reed mannagrass	January 1, 2006	January 1, 2006
Heracleum mantegazzianum	Giant hogweed	January 1, 2006	January 1, 2006
Hesperis matronalis	Dames Rocket	January 1, 2006	January 1, 2006
Homeria	Cape tulip	January 1, 2006	January 1, 2006
Humulus japonicus	Japanese hops	January 1, 2006	January 1, 2006
Hydrilla verticillata	Hydrilla; water-thyme; Florida elodea	January 1, 2006	January 1, 2006
Hygrophila polisperma	Miramar weed	January 1, 2006	January 1, 2006
Imperata brasiliensis	Brazilian satintail	January 1, 2006	January 1, 2006
Ipomoea aquatica Forsk.	Chinese waterspinach	*Permit required - contact Department *January 1, 2006	*Permit required - contact Department January 1, 2006
Iris pseudacorus	Yellow Iris	July 1, 2006	January 1, 2007
Ischaemum rugosum	murain-grass	January 1, 2006	January 1, 2006
Lagarosiphon major	oxygen weed	January 1, 2006	January 1, 2006
Lepidium latifolium	Broad-leafed pepperweed; tall pepperweed	January 1, 2006	January 1, 2006
Leptochloa chinensis	Asian sprangletop	January 1, 2006	January 1, 2006
Ligustrum obtusifolium	Border privet	January 1, 2006	January 1, 2006
Limnophila sessiliflora	ambulia	January 1, 2006	January 1, 2006
Lonicera japonica	Japanese honeysuckle	July 1, 2006	January 1, 2009
Lonicera maackii	Amur honeysuckle	July 1, 2006	January 1, 2009
Lonicera morrowii	Morrow's honeysuckle	July 1, 2006	January 1, 2009
Lonicera tatarica	Tatarian honeysuckle	July 1, 2006	January 1, 2009
Lonicera x bella [morrowii x tatarica]	Bell's honeysuckle	July 1, 2006	January 1, 2009
Lycium ferocissimum	African boxthorn	January 1, 2006	January 1, 2006

Lysimachia nummularia	Creeping jenny; moneywort	July 1, 2006	January 1, 2009
Lythrum salicaria	Purple loosestrife	January 1, 2006	January 1, 2006
Melaleuca quinquenervia	melaleuca	January 1, 2006	January 1, 2006
Melastoma malabathricum		January 1, 2006	January 1, 2006
Microstegium vimineum	Japanese stilt grass; Nepalese browntop	January 1, 2006	January 1, 2006
Mikania cordata	mile-a-minute	January 1, 2006	January 1, 2006
Mikania micrantha	mile-a-minute	January 1, 2006	January 1, 2006
Mimosa diplotricha		January 1, 2006	January 1, 2006
Mimosa invisa	giant sensitive plant	January 1, 2006	January 1, 2006
Mimosa pigra L.	catclaw mimosa	January 1, 2006	January 1, 2006
Miscanthus sacchariflorus	Plume grass; Amur silvergrass	July 1,2006	January 1, 2007
Monochoria hastata	monochoria	January 1, 2006	January 1, 2006
Monochoria vaginalis	pickerel weed	January 1, 2006	January 1, 2006
Myosotis scorpioides	Forget-me-not	July 1,2006	January 1, 2007
Myriophyllum aquaticum	Parrot-feather; water-feather; Brazilian water-milfoil	January 1, 2006	January 1, 2006
Myriophyllum heterophyllum	Variable water-milfoil; Two-leaved water-milfoil	January 1, 2006	January 1, 2006
Myriophyllum spicatum	Eurasian or European water-milfoil; Spike water-milfoil	January 1, 2006	January 1, 2006
Najas minor	Brittle water-nymph; lesser naiad	January 1, 2006	January 1, 2006
Nassella trichotoma	serrated tussock	January 1, 2006	January 1, 2006
Nymphoides peltata	Yellow floating heart	January 1, 2006	January 1, 2006
Opuntia aurantiaca	jointed prickly pear	January 1, 2006	January 1, 2006
Orobanche L.	broomrape	January 1, 2006	January 1, 2006
Oryza longistaminata	red rice	January 1, 2006	January 1, 2006
Oryza punctata	red rice	January 1, 2006	January 1, 2006
Oryza rufipogon Griffiths	red rice	January 1, 2006	January 1, 2006
Ottelia alismoides	duck-lettuce	January 1, 2006	January 1, 2006
Paspalum scrobiculatum	Kodo-millet	January 1, 2006	January 1, 2006

Pennisetum clandestinum	kikuyugrass	January 1, 2006	January 1, 2006
Pennisetum macrourum Trin.	African feathergrass	January 1, 2006	January 1, 2006
Pennisetum pedicellatum Trin.	kyasuma-grass	January 1, 2006	January 1, 2006
Pennisetum polystachyon	missiongrass	January 1, 2006	January 1, 2006
Phalaris arundinacea	Reed canary-grass	January 1, 2006	January 1, 2006
Phellodendron amurense	Amur cork-tree	January 1, 2006	January 1, 2006
Phragmites australis	Common reed	January 1, 2006	January 1, 2006
Polygonum cuspidatum	Japanese knotweed; Japanese arrowroot	January 1, 2006	January 1, 2006
Polygonum perfoliatum	Mile-a-minute vine or weed; Asiatic Tearthumb	January 1, 2006	January 1, 2006
Potamogeton crispus	Crisped pondweed; curly pondweed	January 1, 2006	January 1, 2006
Prosopis pallida	kiawe	January 1, 2006	January 1, 2006
Prosopis reptans	tornillo	January 1, 2006	January 1, 2006
Prosopis strombulifera	Argentine screwbean	January 1, 2006	January 1, 2006
Prosopis velutina		January 1, 2006	January 1, 2006
Pueraria montana	Kudzu; Japanese arrowroot	January 1, 2006	January 1, 2006
Ranunculus ficaria	Lesser celandine; fig buttercup	January 1, 2006	January 1, 2006
Ranunculus repens	Creeping buttercup	January 1, 2006	January 1, 2006
Rhamnus cathartica	Common buckthorn	January 1, 2006	January 1, 2006
Robinia pseudoacacia	Black locust	January 1, 2006	January 1, 2006
Rorippa amphibia	Water yellowcress; great yellowcress	January 1, 2006	January 1, 2006
Rosa multiflora	Multiflora rose	January 1, 2006	January 1, 2006
Rottboellia cochinchinensis	itchgrass	January 1, 2006	January 1, 2006
Rubus fruticosus	wild blackberry complex	January 1, 2006	January 1, 2006
Rubus moluccanus	wild blackberry	January 1, 2006	January 1, 2006
Rubus phoenicolasius	Wineberry; Japanese wineberry; wine raspberry	January 1, 2006	January 1, 2006
Saccharum spontaneum	wild sugarcane	January 1, 2006	January 1, 2006

Sagittaria sagittifolia	arrowhead	January 1, 2006	January 1, 2006
Salsola vermiculata	wormleaf salsola	January 1, 2006	January 1, 2006
Salvinia auriculata	giant salvinia	January 1, 2006	January 1, 2006
Salvinia biloba	giant salvinia	January 1, 2006	January 1, 2006
Salvinia herzogii de la Sota	giant salvinia	January 1, 2006	January 1, 2006
Salvinia molesta	giant salvinia	January 1, 2006	January 1, 2006
Senecio jacobaea	Tansy ragwort: stinking Willie	January 1, 2006	January 1, 2006
Setaria pallidifusca	cattail grass	January 1, 2006	January 1, 2006
Setaria pumila		January 1, 2006	January 1, 2006
Solanum tampicense	wetland nightshade	January 1, 2006	January 1, 2006
Solanum torvum	turkeyberry	January 1, 2006	January 1, 2006
Solanum viarum	tropical soda apple	January 1, 2006	January 1, 2006
Sparganium erectum	exotic bur-reed	January 1, 2006	January 1, 2006
Spermacoce alata	borreria	January 1, 2006	January 1, 2006
Striga Lour.	witchweed	January 1, 2006	January 1, 2006
Trapa natans	Water-chestnut	January 1, 2006	January 1, 2006
Tridax procumbens	coat buttons	January 1, 2006	January 1, 2006
Tussilago farfara	Coltsfoot	January 1, 2006	January 1, 2006
Urochloa panicoides	liverseed grass	January 1, 2006	January 1, 2006