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CULTURAL LANDSCAPE REPORT FOR THE GREEN HILL PARCEL

FREDERICK LAW OLMSTED NATIONAL HISTORIC SITE
BROOKLINE, MASSACHUSETTS



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*"The linden-bordered walks,
giving glimpses of wide stretches
of lawn shaded by splendid
oaks, elms, and beeches, prepare
the seeker for the various
special gardens that lie hidden
in the green frame."*

Hildegarden Hawthorne,
writing of Green Hill in
Century Magazine, 1910

SITE HISTORY

ANALYSIS AND EVALUATION

TREATMENT

Prepared by
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Olmsted Center for Landscape Preservation
National Park Service, Boston, Massachusetts, 2017

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National Park Service, Denver Technical Information Center report FRLA 486 136086

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Cover photograph: View toward the Gardner mansion from the meadow, 2015 (Olmsted Center for Landscape Preservation, hereinafter OCLP).

Title page image: Meadow adjacent to the Clark Sisters' cottage, 2015 (OCLP).

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INTRODUCTION

The Green Hill parcel at Frederick Law Olmsted National Historic Site comprises 5.31 acres along Warren Street at the southern extent of the park's legislative boundary (7.21 acres). The six lots that constitute the 5.31-acre Green Hill parcel were transferred from the Brookline Conservation Land Trust to the National Park Service in 2001. The National Park Service also holds an access easement for one additional lot along Warren Street (0.15 acres) located roughly at the center of the 5.31-acre holding. This lot provides abutters, including the owners of the historic Green Hill mansion and a newer residence in the location of the property's historic barn complex, access to their homes from Warren Street (Figure 1).

Research on the Green Hill parcel was initiated in 2015 in response to a request for technical assistance on the care of the Green Hill parcel landscape. Initial research was targeted on identifying the construction and installation dates of key resources on the parcel, including the stone wall, spruce pole fence, and ornamental plantings. Based on this research, a summary history was developed and supplemented with an analysis of historic and existing conditions. This

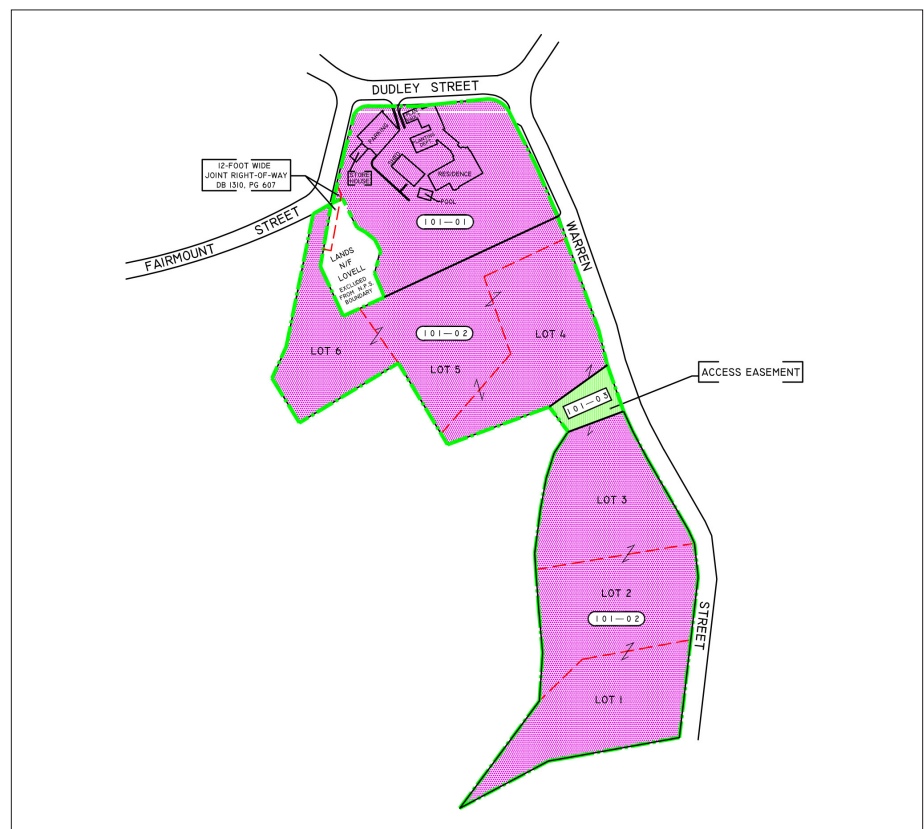


Figure 1. Frederick Law Olmsted National Historic Site legislative boundary map showing six lots (plus access easement in green) that constitute the NPS Green Hill parcel. Plan view, 2015 (NPS).

information was used concurrently to enhance the updated National Register of Historic Places documentation for the park. Subsequently, based on conversations with park staff and the owners of the historic Green Hill mansion, this report was expanded to include treatment recommendations for the 5.31-acre landscape.

Presented within the context of the landscape's significance, existing conditions, and use, these recommendations are intended to provide the park with a vision and schematic plans for improvements to the Green Hill parcel that will allow the landscape to more closely reflect its historic character. The historic view from Faristed's Conservatory is the emphasis of this effort, with the ancillary goals of (1) improving ecosystem function through removal of invasive vegetation and the creation of wildlife habitat and (2) enhancing privacy for adjacent residents by screening views to and from Warren Street. While this report addresses many considerations related to these recommendations, additional design and planning work is needed prior to implementation.

Research for this report was initiated by Daisy Chinburg, SCA Conservation Associate, in July 2013, with additional research and inventory by Chris Beagan, Historical Landscape Architect; Shanasia Sylman, SCA Conservation Associate; and Sasha Bachier, Hispanic Access Foundation Intern in June and July 2015. Repositories consulted include Frederick Law Olmsted National Historic Site Archives, Harvard University's Frances Loeb Library Special Collections (John Charles Olmsted's Papers, circa 1860–1920), Historic New England, Isabella Stewart Gardner Museum Archives, Massachusetts Historical Society (Gardner Family Papers, 1772–1915, Ms. N-1273), Massachusetts State Archives, and the Town of Brookline Massachusetts. Following meetings with park staff and neighbors, treatment recommendations were developed over the summer of 2016 by Angelina Jones, SCA Conservation Associate, and Jenna Gupta, Cultural Resources Diversity Intern, with assistance from park and Olmsted Center for Landscape Preservation staff.

SITE HISTORY

The mansion at 135 Warren Street was built by Captain Nathaniel Ingersoll of Salem in 1806 on land he purchased from Stephen Higginson Sr.¹ The house was designed in the Federal style with a two-story porch in the tradition of a West Indies plantation house. This porch reflected the design of a neighboring home at 215 Warren Street, the Green Hill estate. (The two houses are readily confused by the historic record on account of their matching names and similar appearances.) Shortly after finishing the house, Ingersoll lost his fortune and was forced to sell the property. In 1810, he sold the house and grounds to his father-in-law, Captain Adam Babcock, who at the time was living in Green Hill. The Ingersoll house was sold again in 1823 to Charles Tappan and in 1824 to Deacon Thomas Kendall.²

John Lowell Gardner (1804–84) acquired the Ingersoll house in 1842 and began architectural improvements. Despite changes to the building, the property's grounds were relatively unadorned. The landscape around the house was characterized by rolling hills with prominent specimen trees; other portions of the estate were farmed. An aerial view from 1864 shows the character of the estate, with open views to the east of the mansion, which were accented with young ornamental tree plantings midway down the slope (Figure 2).

Isabella Stewart (1840–1924) married John Lowell Gardner II (1837–98) on April 10, 1860 in New York and moved to Boston soon thereafter. Her husband formally inherited the Ingersoll house in 1884, upon his father's death. At the time, the estate's grounds were under the care of gardener Charles Montague Atkinson. Correspondence between Atkinson and Isabella Stewart Gardner documents some of the improvements that she endeavored to complete on the property. For example, Gardner “insisted on having large trees moved and others cut down so that she might secure the open spaces, the light and air and freedom she desired.”³

Isabella Stewart Gardner named the estate Green Hill, although the name had been used to describe 215 Warren Street (Green Hill) since the 1790s. The Gardner's land holdings were extensive (approximately 34 acres) and roughly bounded by Warren, Fairmount, and Dudley streets. In addition the mansion, the estate included a barn complex (to the west of the mansion) and a conservatory complex (to the south of the mansion, Figure 3). One of the largest adjacent estates (to the south, across Warren Street) was Holm Lea, the 130-acre estate of Ignatius Sargent and later his son, Charles Sprague Sargent (1841–1927), the first director of the Arnold Arboretum.



Figure 2. Aerial view of Green Hill showing a dense canopy of ornamental trees along Warren Street, with the Green Hill driveway and vine-clad house beyond. Several tree species are identifiable, including white pine, beech, sugar maple, and possibly spruce and horsechestnut. The size of the specimens on the hillside suggest that at least some were intentionally planted. View looking west, circa 1864 (National Gallery of Art).

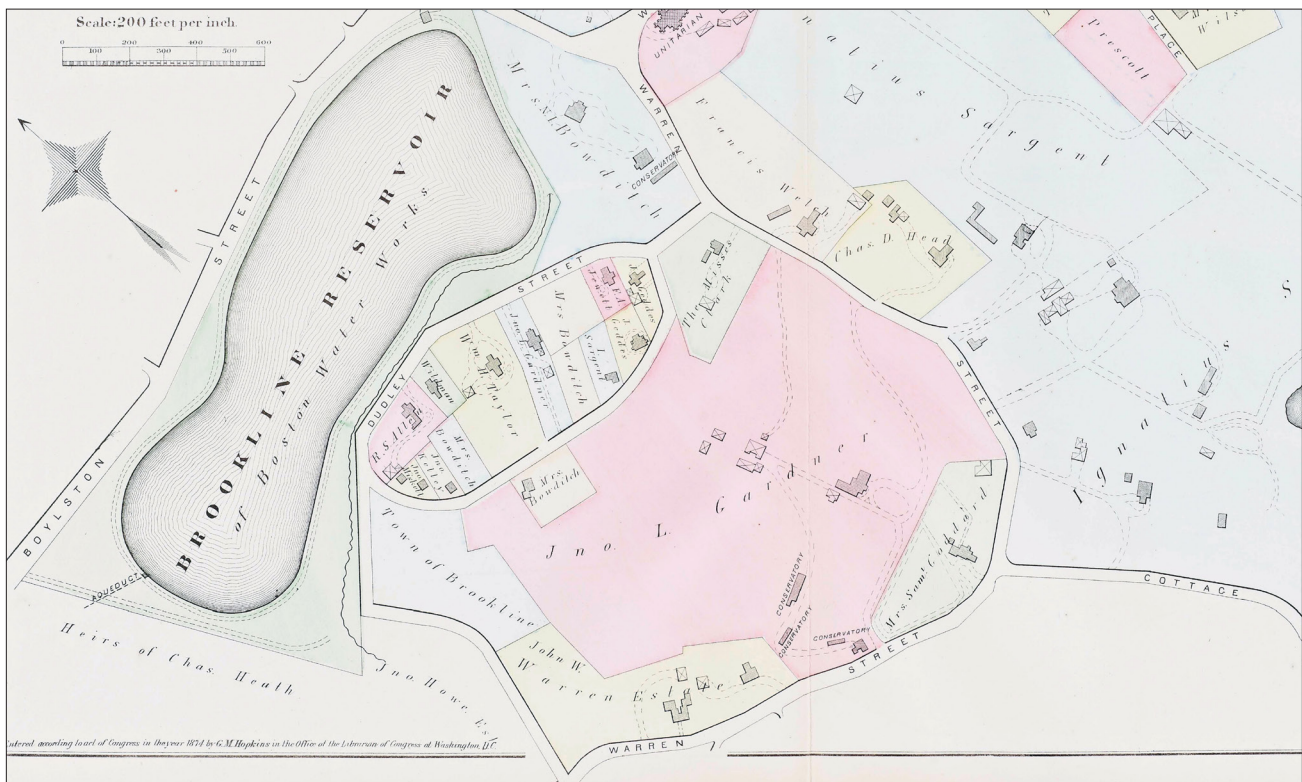


Figure 3. Detail of the *Atlas of the Town of Brookline, Massachusetts*, published by G.M. Hopkins & Co., showing the extent of the John L. Gardner estate at center (in pink). The property of "the Misses Clark" is visible just above (in green), prior to Olmsted's purchase and improvements. Plan view, 1874 (State Library of Massachusetts).

Isabella Stewart Gardner initiated major horticultural improvements at Green Hill, including construction of an Italianate garden, Japanese garden, and extensive heated iris beds. These gardens are illustrated on plates 47–49 in Guy Lowell’s *American Gardens* (Boston: Bates & Guild Company, 1902). Green Hill’s Italianate garden is frequently attributed to Lowell (1870–1927), an architect and landscape architect, who is best known for his design of the Museum of Fine Arts, Boston. The Italianate garden is also illustrated in Warren H. Manning’s chapter on “How to Make a Formal Garden at a Moderate Cost” in *How to Make a Flower Garden* (New York: Doubleday, Page & Company, 1903). Manning (1860–1938) was an employee of F.L. Olmsted & Co., where he was head of the planting department from 1888 to 1896. (While the Green Hill gardens are quite remarkable, well documented, and warrant a study of their own, they are not the focus of this targeted investigation.)

Despite the Gardners’ proximity to the best known landscape architecture firm in the nation, there is no evidence that Isabella Stewart Gardner consulted the Olmsteds on the design of her grounds. She only corresponded once with Olmsted concerning plant material. However, her husband, John Lowell Gardner II, consulted the Olmsteds in 1886–87 on subdivision of land near the intersection of Dudley and Fairmount streets.⁴ Seventeen plans in the Olmsted Archives document this consultation (Olmsted job number 01044). Photographs taken from the south lawn at Fairsted in 1885 and 1886 by John Charles Olmsted (1852–1920) are also among the earliest to show the northern portion of the Green Hill estate (Figures 4 and 5). The character of the landscape, which consisted predominantly of deciduous trees over lawn/meadow (without a woody understory), is readily apparent in winter.

In March 1902, Green Hill was featured in *Country Life in America*. The author of “A New England Garden Home” notes:

But the chief charm of this country seat—as was suggested in the beginning—is not that it adheres to any set rule of landscape-gardening or typifies any particular age or school, but more that it does not. Because it is various, and to a great extent left wild, it has a charm for the nature lover that he can never feel between prim clipped hedges or rigidly bordered walks. I like it best because it is on a hill—an ample, broad-topped, well-rounded hill—so that, although there are other dwellings near, that are so far below that, with the skillful arrangement of the hedges, one looks in all directions without seeing them, as if he were in a wilderness. . . . there is one spot where the hill rounds away to the east without other adornment than its green grass, from which you may look off far over Boston, marked by its golden dome, to Charlestown with its tall monument and taller chimneys, to the harbor and even to the blue ocean beyond.⁵

The impact of the mansion’s siting is evident in a view from Isabella Stewart Gardner’s Guest Book, along with the manicured lawn planted with specimen deciduous trees that carpeted the hillside to the east of the building (Figure 6). A photograph taken by neighbor John Charles Olmsted shows the character of the northern portion of the Green Hill property around the same time, in late winter



Figure 4. View across the south lawn at Fairsted showing the Gardner property beyond the stone wall. A border of deciduous trees along the property line adjoined an open lawn/meadow. View looking southeast, early 1885 (J.C. Olmsted Papers, Scrapbook 1 (1884-1885), photograph #28: "Lawn of 99 Warren St." Courtesy of the Frances Loeb Library, Harvard University Graduate School of Design).



Figure 5. View across the south lawn at Fairsted showing the Gardner property beyond the stone wall. Beyond the treeline at the property boundary, the character of the landscape was more open, with scattered trees over lawn/meadow. View looking southeast, late 1886 (J.C. Olmsted Papers, Scrapbook 2 (1885-1888), photograph #86: "Lawn at 99 Warren St." Courtesy of the Frances Loeb Library, Harvard University Graduate School of Design).



Figure 6. View of the Gardner mansion from the northern corner of the property. The entrance drive, lined with mature deciduous trees, is visible along the left side of the photograph. View looking south, 1902 (*Isabella Stewart Gardner walking at Green Hill*, Guest book 7, Isabella Stewart Gardner Museum, Boston).



Figure 7. "View along Warren Street towards Hood's place," taken by J.C. Olmsted, shows the character of vegetation at the northern end of the Green Hill property and absence of a fence along the stone wall that borders the road. View looking north, March 7, 1900 (Courtesy of the National Park Service Frederick Law Olmsted National Historic Site, Olmsted photo #00673-01-ph06).



Figure 8. View from the upper end of the driveway across the embankment that leads down to Warren Street. The meadow is replete with daisies and bordered by a dense planting of rhododendron. A horsechestnut appears at the right edge of the image frame and a beech at the left. View looking east, most likely 1900-05 (T.E. Marr and Son, *Green Hill*, Isabella Stewart Gardner Museum, Boston).

(Figure 7). The eastern portion of the estate, from the mansion down to Warren Street, is also well documented by a series of photographs from around the turn of the twentieth century taken by Thomas E. Marr, a noted Boston photographer commissioned by Gardner to photograph her homes, Green Hill, 152 Beacon Street, and Fenway Court (Figures 8–16).

After establishing himself in newspaper illustration in the 1870s and 1880s, by the 1890s, Marr was skilled in gelatin silver print-making. He established a firm, Thomas E. Marr & Son, with his son, Arthur, photographing the domestic lives of the leisure class throughout the northeastern United States.⁶ Although his images of Green Hill are undated, by 1902 Marr advertised in the *Boston Directory* for services in landscape and marine photography. It is believed that he took these views of Green Hill about 1900–05 and almost certainly between 1884 and 1919.

Along with the specimen trees over mown lawn and meadow shown in many other historic views of the Green Hill estate, Marr's photographs show copious plantings of rhododendrons along the eastern property boundary. The use of rhododendrons was likely due to the horticultural influence of neighbor Charles Sprague Sargent, who, along with H.H. Hunnewell (1810–1902), is attributed with popularizing rhododendrons in the United States. Marr's photographs are also the earliest to show the spruce pole fence along the southern end of the property's Warren Street frontage.



Figure 9. View of the embankment adjacent to the Gardner mansion, showing rhododendron lining the slope, proximate to the property line. View looking east, most likely 1900-05 (T.E. Marr and Son, *Green Hill*, Isabella Stewart Gardner Museum, Boston).



Figure 10. Detail of the view down the Gardner mansion embankment (Figure 9), showing the silhouette of the spruce pole fence that lined the property's border with Warren Street (center). View looking east, most likely 1900-05 (T.E. Marr and Son, *Green Hill*, Isabella Stewart Gardner Museum, Boston).



Figure 11. View down the embankment adjacent to the Gardner mansion showing the corner of a building on the Julia Goddard estate, since demolished. View looking southeast, most likely 1900-05 (T.E. Marr and Son, *Green Hill*, Isabella Stewart Gardner Museum, Boston).



Figure 12. Detail of the view down the Gardner mansion embankment (Figure 11), showing the spruce pole fence that lined the property's border with Warren Street. The stone wall is also visible at its base, along with gas lamps lining the street. View looking southeast, most likely 1900-05 (T.E. Marr and Son, *Green Hill*, Isabella Stewart Gardner Museum, Boston).

Figure 13. View up the embankment adjacent to the Gardner mansion. An ash tree is visible in the foreground, with rhododendron, meadow grass, and a horsechestnut beyond. Enough light penetrates the tree canopy to support lawn at the base of the slope. View looking west, most likely 1900-05 (T.E. Marr and Son, *Green Hill*, Isabella Stewart Gardner Museum, Boston).



Figure 14. View of the embankment adjacent to the Gardner mansion (comparable to Figure 13), showing a wider view of the embankment area, including a sugar maple at right. View looking west, most likely 1900-05 (T.E. Marr and Son, *Green Hill*, Isabella Stewart Gardner Museum, Boston).



Figure 15. View looking down the slope from the Gardner mansion entrance drive showing the daisy covered meadow and rhododendron-lined property line to the south (right). The spruce pole that bordered Warren Street is visible at the top of the image. View looking east, most likely 1900-05 (T.E. Marr and Son, *Green Hill*, Isabella Stewart Gardner Museum, Boston).



Figure 16. View along the entrance drive as it turns to meet the entrance to the mansion. The embankment edge (to the left of the image) is planted with rhododendron. The distinctive cobble gutters are apparent along the earthen entrance drive. View looking south, most likely 1900-05 (T.E. Marr and Son, *Green Hill*, Isabella Stewart Gardner Museum, Boston).



The Green Hill entrance gate area is well documented by a series of photographs from another circa 1890–1905 Gardner family photo album (Figures 17–21). These views are the earliest to show the property’s distinctive wrought iron and stone entrance gate, although they were most likely constructed long before the photographs were taken, perhaps contemporary with the 1806 mansion. Around the turn of the twentieth century, the photographs show that the drive was loosely lined with deciduous trees, planted particularly densely near the entrance gate, as they remain today.

Hildegarde Hawthorne, granddaughter of Nathaniel Hawthorne, wrote of the Green Hill grounds in *The Century Magazine* in 1910, noting splendid oaks, elms, beeches, and lindens on the property:

Green Hills [sic] is the result of eight years of care and labor, except for the many trees that border its drives or fling their cool shadows on its lawns. These were old when our fathers held the land. The garden has been adapted to them and to the rising contour of the ground with consummate skill. The accents are soft and gradual, and the ways that lead from one charming spot to another so winding that the realization of being on a hill comes only when you finally look about you and perceive that the ground slopes down on every hand and you see only the tops of trees. It is this effect of mystery and surprise that characterizes Green Hills [sic]...⁷

The implications of the mansion’s siting are readily apparent in a circa turn of the twentieth century view from the Green Hill porch, looking to the east toward Boston’s Mission Hill (Figure 21). Specimen trees in the foreground, at mid-slope, provide focal points for the framed view, while denser plantings at the base of the slope screen Warren Street and adjacent homes, and soften the horizon beyond. The presence of both large and small ornamental trees of various species makes clear that their placement was intentional. Among the specimens visible, some remain today including the beech, but most have reached maturity and begun to decline.

Upon Isabella Stewart Gardner’s death in 1924, the eastern portion of the Green Hill estate (approximately 20.2 acres) passed to her nephew, George Peabody Gardner, Jr. (1888–1976). Isabella Stewart Gardner left the western portion the Green Hill estate (13.4 acres), including the Italianate garden, to Harold Jefferson Coolidge. She also left a 55,207 square foot portion of the estate at the middle of its southern end to Olga Eliza Monks.⁸

George Peabody Gardner, Jr. passed the eastern portion of the estate to his son and daughter-in-law, Mr. and Mrs. George Peabody Gardner III (1917–2012), upon his death. Shortly after his father’s death, George P. Gardner III consulted with the Olmsted Brothers in 1978 about subdivision of the estate (Olmsted job number 10659). One plan found in facsimile in the archives of the Isabella Stewart Gardner Museum, shows the result of these consultations (Figure 22).



Figure 17. View of the entrance to the Gardner estate from the vicinity of the barn. The tree-lined entrance drive is visible at center. The drive is also bordered by limited shrub planting. View looking east, 1890-1905 (Courtesy of Historic New England, Gardner Photo Album).



Figure 18. View of the Gardner estate entrance gates from Warren Street. The iron fence is clad in vines, with ornamental deciduous and evergreen trees beyond. View looking west, 1890-1905 (Courtesy of Historic New England, Gardner Photo Album).



Figure 19. View of the Gardner estate entrance gate from the lawn area adjacent to the entrance drive. A beech is visible at right and a sugar maple at left. View looking northeast, 1890-1905 (Courtesy of Historic New England, Gardner Photo Album).



Figure 20. Detail of a view of the Gardner estate entrance gate (Figure 19), showing the silhouette of the gates (center). View looking northeast, 1890-1905 (Courtesy of Historic New England, Gardner Photo Album).



Figure 21. View from the Gardner mansion showing the embankment area. The beech tree that remains at the base of the embankment today is visible at center, immediately to the right of the young tree. Mission Hill is visible beyond. View looking east, 1890-1905 (Courtesy of Historic New England, Gardner Photo Album).

While the 1978 Olmsted-designed subdivision did not move forward, Mr. Gardner contracted Modigliani/Noyes Architects in 1993–93 to develop an alternative master plan for the estate, including subdivision options and a zoning analysis. This analysis references a survey prepared in April 1954 by F.J. Hennessey, which was also used as the base map for the Olmsted Brothers’ earlier work, and notes:

Not surprisingly, many of the large caliper trees shown on the Hennessey plan are no longer extant. A minimum 11 trees over 20” caliper [in 1954] have been documented as lost; while most were elms, maples and oaks have also succumbed to age and storms. The lost trees which were documented are largely trees that once stood alone in the landscape or were part of small 2-3 tree clusters. Their loss is all the more dramatic because they were significant as ‘placeholders’ in the landscape, creating and defining more open and more closed spaces.⁹

In 1980, the Gardner family left 5.31 acres, plus a 0.15-acre access easement, along Warren Street to the Nature Conservancy. The following year, this parcel was transferred to the Brookline Land Trust. This 5.31-acre parcel, plus the 0.15-acre access easement, was transferred to the National Park Service in 2001. Photographs from that year show the character of the parcel, with distinctive spruce pole fencing present along the entirety of the Warren Street frontage, with the exception of a short span between the Green Hill entrance drive and Fairsted, which had been replaced by the Gardners with stockade fence. Vegetation beyond the fence appeared unkempt (Figures 23 and 24).

In 1996, George P. Gardner III listed Green Hill (15 acres) for sale. With no success, he subdivided the estate into four lots of about four acres each in 1997. The four parcels were sold, and the unique Federal style carriage house that once belonged to the Gardner mansion was moved to the Shirley-Eustis House in Roxbury at the urging of David Mittell, one time president of the House Association.¹⁰ Among the architectural distinctions of the Gardner estate, it is believed that the manure shed behind the Gardner barn was the first commission by George Foster Shepley, later partner at Shepley, Rutan & Coolidge.¹¹ This building, however, was lost during the subdivision and subsequent development.

In the late 1990s and early 2000s, three new homes were added to the eastern portion of the former Gardner estate. Two were sited in the historic locations of the barn and conservatory complex. The third was sited along Fairmount Street. Today, all are privately owned along with the historic Green Hill mansion.

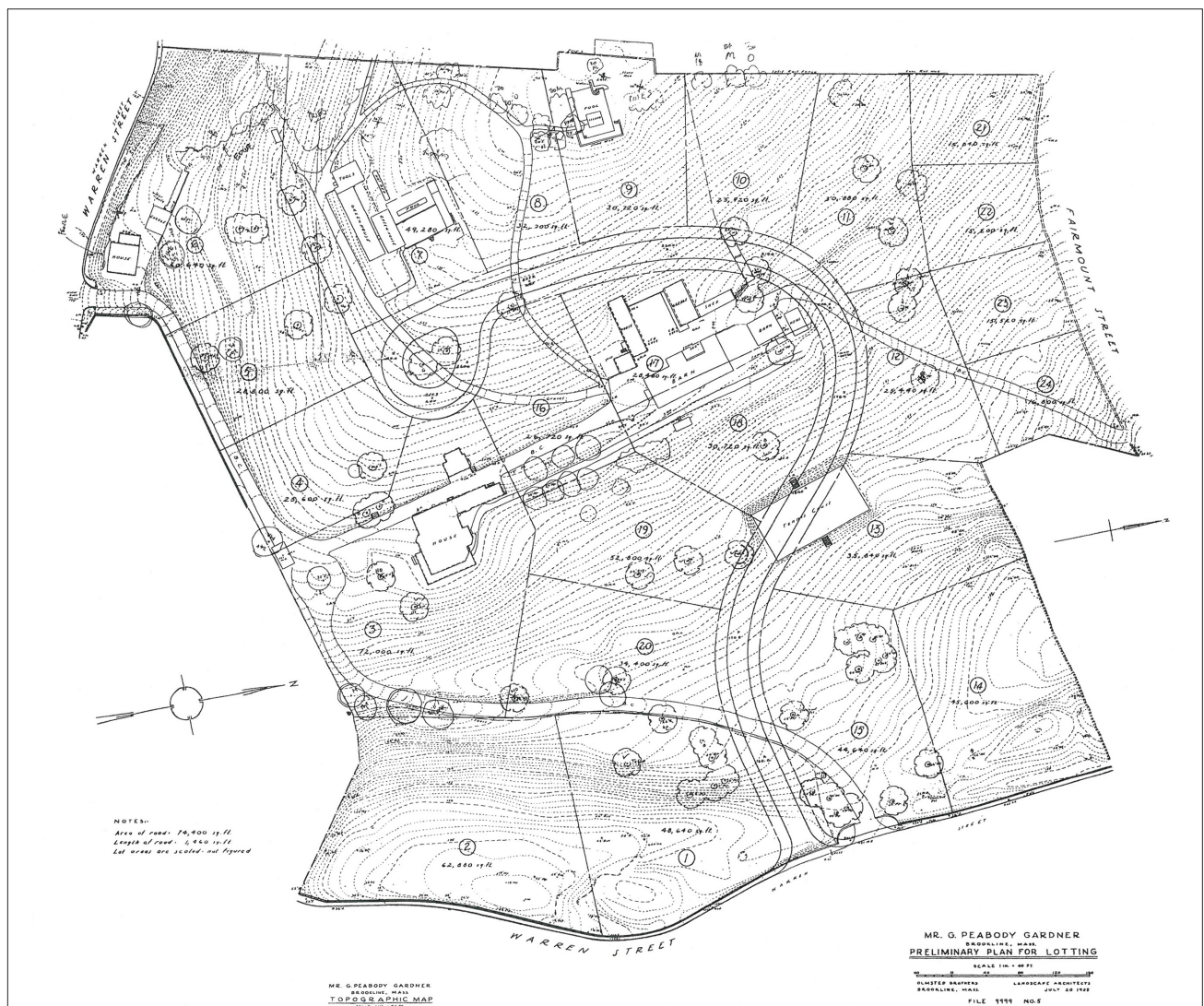


Figure 22. Olmsted Brothers' subdivision proposal prepared for George P. Gardner showing the subdivision potential of the estate (twenty-four lots). The drive that curves west of the mansion was never constructed. The location of the tennis court explains the unique shape of present day Lots 5 and 6 (see Figure 1) relative to the 111 Warren Street entrance drive. Fairsted is located to the lower right. Plan view, 1955 (Courtesy of the National Park Service Frederick Law Olmsted National Historic Site).



Figure 23. The former Gardner mansion from Warren Street, prior to rehabilitation. The spruce pole fence and several middle-aged trees are visible in the foreground. View looking west, 2001 (Courtesy of Historic New England, Robert Bayard Severy Photograph Collection).



Figure 24. Warren Street from the driveway opposite the former Gardner estate. The entrance gates are visible at left, along with sections of spruce pole fence, stockade fence, and spruce pole fence alternating in the direction of Fairsted. View looking north, 2001 (Courtesy of Historic New England, Robert Bayard Severy Photograph Collection).

ANALYSIS AND EVALUATION

This section describes each of the primary landscape characteristics and features of the 5.31-acre Green Hill parcel, a component of the 7.06-acre Frederick Law Olmsted National Historic Site. Landscape characteristics and features are tangible aspects that define a landscape's overall appearance and aid in understanding its cultural value. For the Green Hill parcel, these characteristics and features include topography, views and vistas, vegetation, and small-scale features. This narrative is supplemented by an existing conditions drawing that documents the approximate size and location of all landscape features (Drawing 1).

The physical integrity of the Green Hill parcel is evaluated by comparing landscape characteristics and features present during the period of significance with current conditions. Period of significance is the length of time when a property was associated with important events, activities, or persons, or attained the characteristics that qualify it for National Register listing. However, definition of the period of significance for the Green Hill parcel remains under consideration. Three key planning documents reference different dates that are pertinent to the management of historic landscape character of the entire 7.06-acre National Park Service-owned site.

GENERAL MANAGEMENT PLAN

A treatment reference date provides an objective benchmark for managing historic character in a landscape. The park's 1983 *General Management Plan* established a circa 1960 treatment reference date. In 1987, the *General Management Plan* was amended to revise the treatment reference date to circa 1930. Several factors led to this decision, including the strength of documentation available for the landscape circa 1930, which minimized conjecture in landscape treatment. Circa 1930 also correlated with the peak size and productivity of the Olmsted Brothers firm and all buildings were completed on the site by this time.¹² Based on this decision, Fairsted's landscape was restored in the late 1980s and 1990s to its appearance circa 1930. The National Park Service continues to manage the Fairsted landscape to reflect its appearance circa 1930.

GREEN HILL HISTORIC DISTRICT

The Green Hill Historic District was established in 1985 and lays directly to the south of Fairsted, along portions of Warren, Sargent, Cottage and Fairmount streets. The entire Green Hill estate, including the 5.31-acre Green Hill parcel owned by the National Park Service, is within the boundary of the Green Hill Historic District, which falls within the Brookline Multiple Resource Area. The district encompasses thirty-four contributing historic properties, including Green Hill, and five non-contributing properties. The district is noted for its collection of nineteenth century houses built predominately as summer residences for Boston businessmen. According to documentation:

The area has retained much of its 19th century flavor. This is due, in part, to two narrow winding roads included within the boundaries (Warren Street and Cottage Street); low stone walls; careful retention of landscaping features and appropriate screening for newer houses; the relatively unaltered late 18th and 19th century residences; and the minimum one-acre zoning status for many of the properties.¹³

George Cabot's acquisition of the Green Hill estate at 215 Warren Street in 1793 marked the beginning of a series of a number of prominent individuals who purchased or built homes in the area. These individuals included Samuel Perkins, Thomas Coffin Amory, Isaac Cook, John Lowell Gardner, Ignatius Sargent, Thomas Parsons, and later, Henry Hobson Richardson, and Charles Sprague Sargent. The district meets National Register Criteria A (Event), B (Person), and C (Design). The district's period of significance is documented simply as "nineteenth century." However, contributing resources within the district both pre-date and post-date the nineteenth century. Based on the construction dates of contributing resources within the district, a more specific period of significance might be defined as circa 1742 (construction of 215 Warren Street) to 1920 (construction of 307 Warren Street).

NATIONAL REGISTER DOCUMENTATION

In July 2014, a draft National Register of Historic Places Boundary Increase was completed to incorporate the entire acreage within the current authorized boundary for Frederick Law Olmsted National Historic Site, update the count of contributing and non-contributing resources, and revise the areas and period of significance.

The draft documentation identified significance under Criterion A (Event) in the area of community planning and development; Criterion B (Person) for its association with Frederick Law Olmsted, Sr., Frederick Law Olmsted, Jr., and John Charles Olmsted; Criterion C (Design) in the area of landscape architecture; and Criterion D (Information Potential) for its potential ability to yield archeological

data that will contribute to a more detailed understanding of the site. The period of significance was defined as 1883–1979, beginning when the Olmsted family and firm moved to Fairsted and ending when the last additions were made to the Olmsted Archives, remaining members of the Olmsted firm left Fairsted, and the National Park Service acquired the site.

While the draft National Register Boundary Increase documented the overarching period of significance for the entire 7.06-acre park as 1883 to 1979, the 1.75-acre Fairsted landscape is specifically evaluated in relation to its significance under Criterion C (Design), in the area of landscape architecture. The documentation referenced the significance of the Fairsted landscape from 1883 to circa 1930. This period includes Olmsted Sr.'s initial design for the grounds, implemented between 1883 and circa 1904, with modifications made through circa 1930 by his successors that did not alter the landscape's fundamental characteristics.

The draft documented fifteen contributing resources: house, barn, offices, storage shed, front gateway arch, perimeter fence, carriage turn, front entry walkway, retaining wall, hollow path, rock garden path, stone wall, board fence, lattice fence, and Fairsted grounds. The restored grounds were identified as a contributing site, encompassing the original 1.75-acre parcel acquired by the National Park Service in 1979 and illustrative of many of the Olmsted firm's landscape design principles. A chain link fence was noted as the only non-contributing resource. No resources on the 5.31-acre Green Hill parcel were documented.

The National Register Boundary Increase draft was submitted to the Massachusetts State Historic Preservation Office (SHPO) for review. In review comments received in a letter dated February 20, 2015, the Massachusetts SHPO recommended identifying the south lawn, rock garden, and courtyard as contributing sites; adding the visitor parking lot as a non-contributing site; adding the drainage tile system at the visitor parking lot as a contributing resource; and acknowledging "the role of the site as a research lab and the establishment at Fairsted of the Olmsted Center for Landscape Preservation in terms of Criterion C."

The draft National Register Boundary Increase documentation should be revised to clarify the period of significance and identify contributing and non-contributing resources for the 5.31-acre Green Hill parcel in both narrative and mapping formats.

ANALYSIS OF LANDSCAPE CHARACTERISTICS AND FEATURES

Based on the lack of clarity regarding the period of significance for the Green Hill parcel, the flowing analysis has been parsed into two historic period end dates: 1899 (Green Hill Historic District period of significance end date) and circa 1930 (Fairsted landscape treatment reference date). Those features that were present during the historic period(s), retain their historic character, and are associated with the historic significance of the landscape are described as contributing. Those that were not present during the historic period(s), do not retain their historic character, and/or are not associated with the historic significance of the landscape are described as non-contributing.

TOPOGRAPHY

Topography is the three-dimensional configuration of a landscape surface characterized by features (such as slope and articulation) and orientation (such as elevation and solar aspect).¹⁴

Historic Condition: Historic photographs from the turn of the twentieth century show the topography of the 5.31-acre parcel largely as it remains today, with gentle to steep slopes throughout the area. In the 1870s, a service drive extended from the northeastern corner of the parcel to the Gardner barn complex (see Figure



Figure 25. View just beyond the entrance drive, at the base of the slope. The Gardner mansion is to the right, Warren Street to the left. A mature beech, now in decline, is visible at center. This same tree is visible in Figure 21, taken 1890-1905. View looking south, 2015 (OCLP).

3,) and in the nineteenth century, a tennis court stood just west of Lot 5/south of Lot 6 (see Figure 1), in the present location of the driveway to 111 Warren Street (see Figure 22). These two historic landscape features may have affected the topography across the northern portion of the parcel prior to the 1930s. However, the appearance of the topography across the entire parcel is consistent with its appearance circa 1930.

Existing Condition: The entirety of the 5.31-acre Green Hill parcel is gently sloping to steep, with a dramatic descent in elevation from the west to the east and a gentle descent in elevation from the south to the north, toward Fairsted. The steepest portion of the parcel lies at its southern extent, while the most level portion is at the northern extent of the parcel, near Fairsted. The greatest grade change across the site is approximately 40', from the westernmost point in the park to a low point along the stone wall that separates the parcel from Fairsted. A small outcropping of Roxbury puddingstone stands at a topographic rise across from the intersection of Warren Street and Sargent Road (Figure 25).

Evaluation: The general topography of the parcel remains intact from 1899 and is contributing when considered with respect to both 1899 and circa 1930 reference dates. Topographic changes across a small portion of the site, associated with removal of the tennis court present in the nineteenth century, may impact the integrity of the site's topography.

VIEWS AND VISTAS

*Views and vistas are the prospect created by a range of vision in a landscape, conferred by the composition of other landscape characteristics and associated features. Views are the expansive or panoramic prospect of a broad range of vision, which may be naturally occurring or deliberately contrived. Vistas are the controlled prospect of a discrete, linear range of vision, which is deliberately contrived.*¹⁵

Historic Condition: View into and across the 5.31-acre Green Hill parcel were largely defined by vegetation and fencing throughout the historic period. Southerly views into the parcel from Fairsted were farmed and filtered by mature trees at the northern end of the parcel and enabled by a low understory of largely lawn/meadow grass. Views into and across the parcel from the Green Hill mansion and entrance drive were similarly made possible by low meadow grass on the understory, with specimen trees forming a loose canopy above. Along the northern property boundary, a dense planting of rhododendron, present around the turn of the twentieth century, defined the extent of and directed views into the Green Hill parcel, while helping to screen adjacent buildings and the spruce pole fence along Warren Street.

Existing Condition: There are many views into and across the parcel, including the view from Fairsted into the southern portion of the Green Hill parcel, the view into and across the parcel from the Green Hill mansion, and the view into and across the parcel from the Green Hill entrance drive. The view from Fairsted into the southern portion of the Green Hill parcel is compromised by the growth of volunteer trees and understory vegetation at the southern end of the parcel. Views into and across the parcel from the Green Hill mansion and entrance drive remain intact, diminished only by the loss of specimen trees and spruce pole fence along Warren Street.

Evaluation: Views into and across the Green Hill parcel remain intact from 1899 and are contributing when considered with respect to both 1899 and circa 1930 reference dates.

VEGETATION

*Vegetation includes the deciduous and evergreen trees, shrubs, vines, groundcovers, and herbaceous plants, and plant communities, whether indigenous or introduced in a landscape.*¹⁶

Canopy

Historic Condition: Photographs taken between 1900 and 1905 by T.E. Marr are the earliest to clearly show the character of vegetation along the eastern edge of the Gardner family's property at 135 Warren Street (see Figures 8–16). These views show a canopy of mostly deciduous trees at the base of the embankment, with a buffer planting of rhododendron. The trees appear to be a mixture of native species and exotic specimens that were intentionally planted. While relatively dense along the eastern boundary of the property, the strip of mature trees was narrow enough to allow light to penetrate to the understory.

As maintenance of the area along Warren Street waned in the late twentieth century, likely due to the Gardner family's consideration of subdividing the large estate, successional vegetation began to replace openings in the tree canopy. In particular, Norway maples widely colonized the area at the foot of the embankment, creating a heavier tree canopy and darker understory. With transfer of the parcel to the Town of Brookline Conservation Commission in 1981, maintenance was limited. Upon transfer to the National Park Service in 2001, the park service made efforts to reduce brush and fire load on the parcel through arboricultural projects. Trees on the parcel were inventoried for the first time in 2010 as part of an *Asian Longhorn Beetle Management Plan* for the park and have been inventoried for this summary report.



Figure 26. View from the topographic rise on the south side of the Gardner estate entrance drive showing Warren Street at right, along with a collapsed section of spruce pole fence. Several historic white pine trees are visible from this vantage point. Fairsted is located at center, beyond heavy foliage. View looking north, 2015 (OCLP).

Existing Condition: Vegetation within the 5.31-acre Green Hill parcel is characterized by a dense canopy of mixed evergreen and deciduous trees along the eastern and northern property boundaries, with scattered specimen trees on the embankments to the west. The canopy is dominated by Norway maple and white pine on the southern half of the parcel. However, many large and noteworthy specimens remain, including beech, red oak, tulip poplar, American linden, and sugar maple (Figure 26). Drawing 1 documents the species (at least twenty-seven) and locations of tree specimens larger than approximately 8" diameter at breast height throughout the 5.31-acre parcel.

Evaluation: Trees that remain from the historic period (ending either 1899 or circa 1930) are contributing when considered with respect to the reference dates. Trees that have self-seeded since the end of the historic period are non-contributing when considered with respect to both reference dates.

Understory

Historic Condition: Photographs taken between 1900 and 1905 by T.E. Marr are the earliest to clearly show the character of understory vegetation along the eastern edge of the Gardner family's property at 135 Warren Street (see Figures 8–16). The slope of the embankment was planted with meadow grass, show with daisies in bloom in Marr's photographs, while the southern property boundary



Figure 27. View from the top of the slope adjacent to the 111 Warren Street entrance drive. Fairsted is located to the left. Norway maples and a catalpa are visible, along with a scrub herbaceous layer in this sun-exposed area. The ornamental pine at right is on the property of 111 Warren Street. View looking east, 2015 (OCLP).



Figure 28. View from the vicinity of the historic tennis court looking toward the former Gardner mansion, at center. The scrub herbaceous layer in the foreground is property of NPS. The manicured lawn beyond is property of 111 and 135 Warren Street. View looking southwest, 2015 (OCLP).

was lined with rhododendron. On the northern portion of the parcel, historic photographs suggest that the landscape was maintained in mown lawn and meadow grass (see Figure 19), thus enabling views across the northern portion of the parcel from Fairsted.

As maintenance of the area along Warren Street waned in the late twentieth century, likely due to the Gardner family's consideration of subdividing the large estate, successional vegetation began to replace openings in the tree canopy. This resulted in a heavier tree canopy and darker understory, which in turn effected the composition of understory species. With transfer of the parcel to the Town of Brookline Conservation Commission in 1981, maintenance was limited. Upon transfer to the National Park Service in 2001, the park service made efforts to reduce brush and fire load on the parcel through arboricultural projects. Invasive understory species were inventoried by the National Park Service Exotic Plant Management Team in June 2015. The findings of this inventory are pending.

Existing Condition: The understory across most of the 5.31-acre Green Hill parcel is comprised of unmown meadow, with scrub vegetation within an approximate 100' buffer along Warren Street. A few ornamental plant specimens suggest an earlier, more manicured character to the landscape, including spirea, lily of the valley, forsythia, wintercreeper, and shrub roses (Figures 27 and 28). Along the slopes at the northern and southern ends of the parcel, the understory consists of unmown lawn and scrub vegetation, with invasive species prevalent.

Evaluation: The existing understory does not reflect its historic character in 1899 or circa 1930 and is non-contributing when considered with respect to both reference dates.

SMALL-SCALE FEATURES

Small-scale features are the elements providing detail and diversity for both functional needs and aesthetic concerns in a landscape.¹⁷

Stone Wall

Historic Condition: The construction date of the stone wall that borders the Warren Street line with the Green Hill property is not known. However, the wall was in place by the turn of the century, when it is shown in photographs taken in 1900 by John Charles Olmsted (see Figure 7) and between 1900 and 1905 by T.E. Marr (see Figures 8–12). From just after the turn of the twentieth century (post-1900) until at least 2001, the southern stretch of the wall was topped by a spruce pole fence that matched the spruce pole fence that borders Fairsted. Spruce pole fencing is first evidenced in photographs along the northern stretch of the wall in the 1930s.



Figure 29. View to the former Gardner mansion from Warren Street, showing the low, mortared stone wall that borders the sidewalk. A carpet of lily-of-the-valley is visible on the topographic rise at the base of the wall. Note that light is dappled as a result of the dense canopy. Compare this view with Figure 23, taken 2001. View looking west, 2015 (OCLP).

Existing Condition: The stone wall extends approximately 850 linear feet along Warren Street and varies in height from approximately 16” to 36” above adjacent grade. Portions of the wall along its southern extent are slightly retaining. The wall consists of rough-hewn Roxbury puddingstone held together conspicuously with mortar. The wall does not have a capstone, but is topped by segments of spruce pole and stockade fence to the north of the Gardner estate driveway. Aside from a short segment adjacent to the entrance gate, the wall is largely without a fence to the south (Figure 29). Portions of the wall are deteriorated and in need of repair and repointing.

Evaluation: The stone wall was present in both 1899 and circa 1930, and is contributing when considered with respect to both reference dates.

Spruce Pole Fence

Historic Condition: From just after the turn of the twentieth century until at least 2001, a spruce pole fence stood on top of the southern extent of the stone wall that borders the Warren Street line with the Green Hill property. This fence segment is first documented by photographs of the Gardner estate taken between 1900 and 1905 by T.E. Marr (see Figures 8–12).

A photograph from March 7, 1900 shows that the fence was not present along the northern stretch of the wall, indicating that the northern stretch of spruce



Figure 30. Detail of the spruce pole fence that borders the Green Hill parcel (left) at its juncture with the Fairsted spruce pole fence (right). The Green Hill fence is in poor condition, set on a mortared stone wall, while the Fairsted fence is in good condition, set above loose boulders. While the fences have similar designs, the density of spruce poles on the two fences varies considerably. View looking west, 2015 (OCLP).



Figure 31. View along Warren Street from opposite the entrance gates. A short spruce pole fence segment is visible at center, set on the mortared stone wall, adjacent to the entrance gate's carved stone end pier. Several historic trees are also visible, including sugar maples and an American linden. A young yellowwood stands to the right. View looking southwest, 2015 (OCLP).



Figure 32. Detail of the spruce pole fence at its present southern extent showing contemporary bracing designed to keep the deteriorated fence upright. View looking north, 2015 (OCLP).

pole fence (or possibly the entire fence) was installed after 1900 (see Figure 7).¹⁸ However, the spruce pole fence is well documented along the northern portion of the Green Hill property in photographs taken by Harry D. Perkins of the Olmsted Brothers firm in the 1930s (Olmsted NHS archives photographs #673-145 and 673-146).¹⁹

Existing Condition: Only three short segments of the spruce pole fence along the Green Hill property remain. They extend from the northern corner of the property, adjoining Fairsted, to midway to the entrance drive (120 linear feet), from midway along the northern portion of the stone wall to the entrance gate (32 linear feet), and along the southern portion of the wall from the entrance gate extending to the south (90 linear feet). The fence is constructed of rebar posts set approximately every 8' on center. Two horizontal stringers support peeled spruce logs 1 ¼ to 1 ½" in diameter set 2 ½ to 3" on center and vertically to a height of 5'. These three remaining fence segments are in poor condition, with portions



Figure 33. View along Warren Street showing the carved stone end pier associated with the entrance gate, and spruce pole fence, stockade fence, and spruce pole fence segments alternating in the direction of Faristed. Compare this view with Figure 24, taken 2001. View looking northwest, 2015 (OCLP).

leaning and missing spruce poles (Figures 30 and 31). Bracing was installed behind portions of the fence after the National Park Service acquired the property to prevent further loss (Figure 32).

Evaluation: Remaining portions of the spruce pole fence were not present in 1899 and are non-contributing when considered with respect to an 1899 reference date. Remaining portions of the spruce pole fence were present circa 1930 and are contributing when considered with regard to a circa 1930 reference date.

Stockade Fence

Historic Condition: The stockade fence was not present during the historic period.

Existing Condition: The stockade fence was installed just prior to National Park Service acquisition of the 5.31-acre Green Hill property in 2001 along a short (105 linear feet) portion of the northern end of the stone wall to replace a missing segment of spruce pole fence. It is believed that the fence was installed to provide privacy for the Gardner family in preparation for a special event. The fence consists of two horizontal stringers that support tightly spaced wooden pickets set vertically to a height of 5' above the stone wall. The fence is in poor condition, with portions leaning (Figure 33).

Evaluation: The stockade fence was not present in 1899 or circa 1930 and is non-contributing when considered with respect to both reference dates.

Cultural Landscape Report
Green Hill Parcel
Frederick Law Olmsted
National Historic Site
Brookline, Massachusetts
Existing Conditions Plan



National Park Service
Olmsted Center for Landscape Preservation
www.nps.gov/oclp

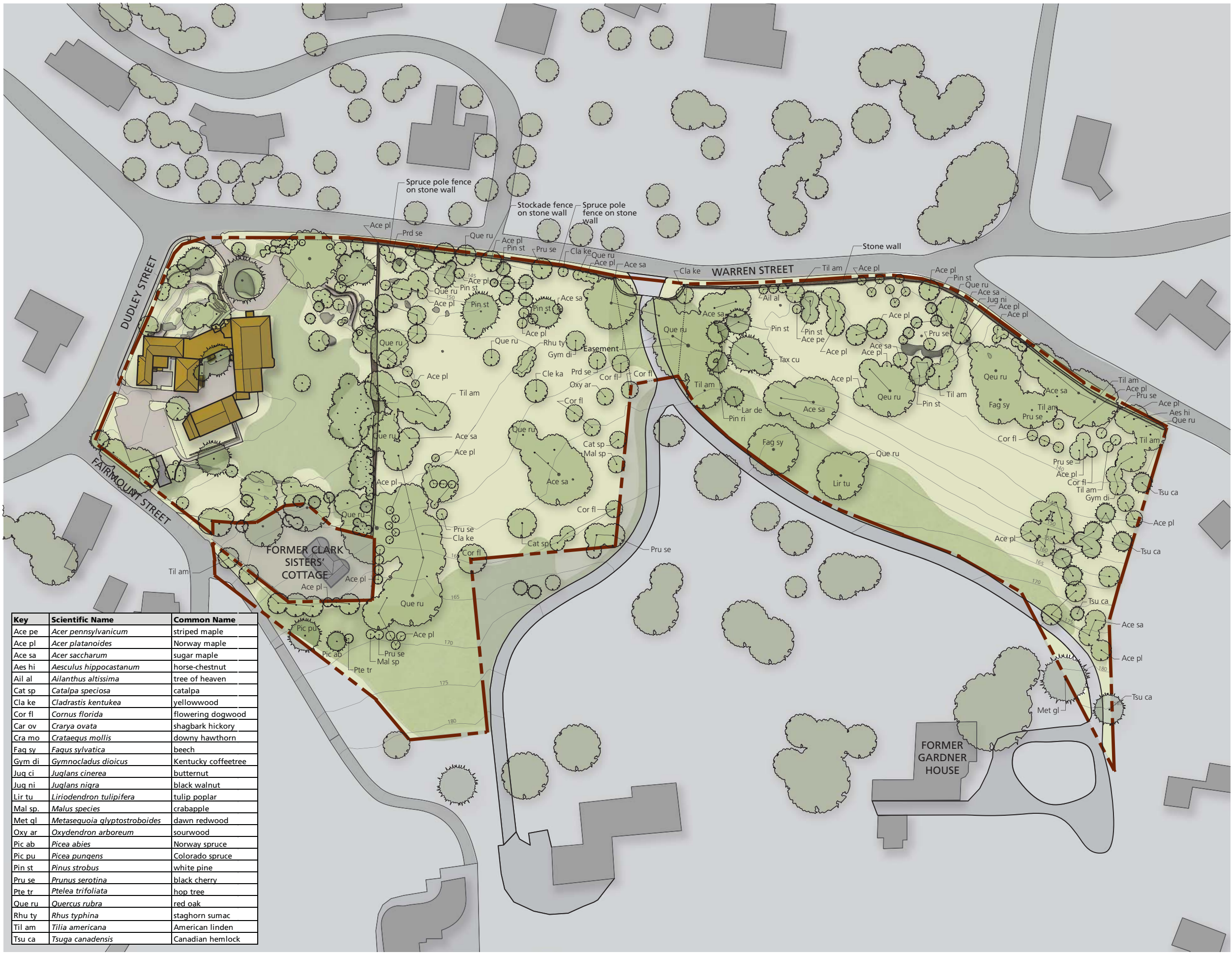
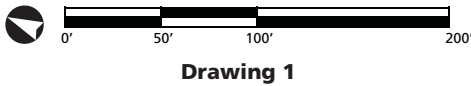
- SOURCES
- 1. Bryant Associates Survey, 1999
 - 2. MEA Partial Topographic Survey, 2006
 - 3. Aerial Photograph, MassGIS, 2009

DRAWN BY
Adrine Arakelian (2011), Shanasia Sylman and Chris Beagan (2015), OCLP
AutoCAD Map 3D, Photoshop CS5, Illustrator CS5

LEGEND

- Olmsted NHS Boundary
- Olmsted NHS Building
- Other Building
- Deciduous Tree
- Evergreen Tree
- Shrub
- Lawn / Groundcover
- Asphalt / Bituminous Concrete Road
- Stonedust Drive / Walk
- Stone Wall
- Ledge

- NOTES
- 1. Contour Interval = 5'-0"
 - 2. All features shown in approximate scale and location.



Key	Scientific Name	Common Name
Ace pe	<i>Acer pennsylvanicum</i>	striped maple
Ace pl	<i>Acer platanoides</i>	Norway maple
Ace sa	<i>Acer saccharum</i>	sugar maple
Aes hi	<i>Aesculus hippocastanum</i>	horse-chestnut
Ail al	<i>Ailanthus altissima</i>	tree of heaven
Cat sp	<i>Catalpa speciosa</i>	catalpa
Cla ke	<i>Cladrasia kentukea</i>	yellowwood
Cor fl	<i>Cornus florida</i>	flowering dogwood
Car ov	<i>Crarya ovata</i>	shagbark hickory
Cra mo	<i>Crataegus mollis</i>	downy hawthorn
Fag sy	<i>Fagus sylvatica</i>	beech
Gym di	<i>Gymnocladus dioicus</i>	Kentucky coffeetree
Jug ci	<i>Juglans cinerea</i>	butternut
Jug ni	<i>Juglans nigra</i>	black walnut
Lir tu	<i>Liriodendron tulipifera</i>	tulip poplar
Mal sp.	<i>Malus species</i>	crabapple
Met gl	<i>Metasequoia glyptostroboides</i>	dawn redwood
Oxy ar	<i>Oxydendron arboreum</i>	sourwood
Pic ab	<i>Picea abies</i>	Norway spruce
Pic pu	<i>Picea pungens</i>	Colorado spruce
Pin st	<i>Pinus strobus</i>	white pine
Pru se	<i>Prunus serotina</i>	black cherry
Pte tr	<i>Ptelea trifoliata</i>	hop tree
Que ru	<i>Quercus rubra</i>	red oak
Rhu ty	<i>Rhus typhina</i>	staghorn sumac
Til am	<i>Tilia americana</i>	American linden
Tsu ca	<i>Tsuga canadensis</i>	Canadian hemlock

TREATMENT

This describes a philosophical framework that provides context for the treatment recommendations included in this report. This section includes a brief overview of enabling legislation and park planning, and a treatment philosophy that articulates a guiding vision for the 5.31-acre NPS-owned Green Hill parcel landscape. Based on this framework, treatment recommendations for the Green Hill parcel describe tasks necessary for rehabilitations of the landscape to reflect its appearance in the late nineteenth and early twentieth century, while accommodating contemporary needs.

ENABLING LEGISLATION

Prior to the establishment of the Frederick Law Olmsted National Historic Site, Fairsted and its grounds were recognized for their significance. In 1965, the property was designated a National Historic Landmark, and in 1966 the property was listed on the National Register of Historic Places with passage of the National Historic Preservation Act.

Frederick Law Olmsted National Historic Site was established by Public Law 96-87, passed on October 12, 1979, to "...preserve and interpret for the benefit, inspiration, and education of present and future generations the home and office of Frederick Law Olmsted..."²⁰ The enabling legislation allowed not only for the purchase of 99-101 Warren Street, but for its purchase "together with such adjacent lands and interests therein as the Secretary [of the Interior] deems necessary for the establishment of the Site."²¹ Initially, however, the park comprised 1.75 acres, including Fairsted, its immediate grounds, and archival collection.

On November 2, 1998, passage of Public Law 105-343 enabled the National Park Service to accept, by donation, of a portion of the adjoining former Green Hill estate from the Brookline Conservation Land Trust. The stated purpose of this addition was "... to preserve and maintain the historic setting of the Site... to be used for educational and interpretive purposes and [to] be maintained and managed as part of the Frederick Law Olmsted National Historic Site."²² In his Congressional testimony, Destry Jarvis, Assistant Director, External Affairs, National Park Service, also cited the Brookline Land Conservation Trust's goals of "ensur[ing] preservation of one of the few remaining open field and woodland environments in Brookline" as well as the agency's goals of "ensur[ing] that

the visual and historic integrity of the site is maintained.”²³ The six parcels that constitute the 5.31 acre property were subsequently transferred to the National Park Service in 2001.

GENERAL MANAGEMENT PLAN

The *General Management Plan for Frederick Law Olmsted National Historic Site* was completed in 1983 and called for preserving, “. . .the historic scene at Fairsted, including the landscaped grounds, and to encourage preservation of the character of the neighborhood.”²⁴ The 1983 *General Management Plan* established a 1960 treatment reference date. In 1987, however, the reference date was amended to end circa 1930. Several factors led to this decision, including the strength of documentation available for the landscape circa 1930, which minimized conjecture in landscape treatment. Circa 1930 also correlated with the peak size and productivity of the Olmsted Brothers firm and all buildings were completed on the site by this time.²⁵

The September 11, 2008 edition of the *Federal Register* included a Notice of Intent to prepare an Environmental Impact Statement for an update to the *General Management Plan*.²⁶ Among other goals, the *General Management Plan* updates were intended to include “. . .strategies for conserving the adjacent historic setting and the larger historic context. . .” of the park. The updated *General Management Plan* was scheduled for public review in 2010, but was not completed before the National Park Service discontinued use of general management plans throughout the system.

TREATMENT PHILOSOPHY

The landscape treatment philosophy for the Green Hill parcel articulates the essential qualities in the landscape that convey its significance and establishes principles intended to perpetuate those qualities. The philosophy is consistent with principles derived from the park’s significance. This philosophy helps to guide decision making and provides context for recommended treatment tasks:

The Green Hill parcel at Frederick Law Olmsted National Historic Site is a remnant of a residential designed landscape that was home to influential families in the nineteenth and twentieth centuries. Historically, the landscape served as the perimeter of Green Hill, a once vast estate, and as a borrowed view from Fairsted. A canopy of mostly deciduous trees, with mixed native and exotic specimens, elicited the feeling of woodland. Near and distant views, framed by mature trees and low understory, were integral to its character. After the turn of the twentieth

century, a spruce pole fence provided privacy from Warren Street, while upland a meadow bloomed with daises and native grasses, bordered by a dense planting of rhododendron.

Today, in spite of an abundance of invasive and disease-prone tree species, the woodland character of the Green Hill parcel remains evident. The understory along the slopes of the parcel is characterized by unmown lawn and scrub vegetation, also largely comprised of invasive species, with a few remnant species that speak to the landscape's earlier character. Key views into and across the Green Hill parcel largely remain, yet the borrowed view from Fairsted into the northern portion of the parcel is partially obstructed by volunteer trees and understory vegetation. A deteriorating stone wall and sections of missing spruce pole fence along Warren Street have diminished the sense of seclusion once afforded by the landscape.

The Green Hill parcel will be rehabilitated will perpetuate the landscape's historic character and adapt to meet contemporary use. Rehabilitation will:

- Perpetuate of the historic features and characteristics of the Green Hill parcel landscape, including vegetation, views, and small-scale features
- Improve the ecological health of Green Hill parcel landscape
- Reinforce continuity between Fairsted and the Green Hill parcel
- Accommodate residential privacy

The landscape will be enhanced to reflect its historic character through removal of hazardous trees and invasive species, replacement of missing historic trees, rehabilitation of the meadow and understory, and repair of the stone wall along Warren Street. Residential privacy might appropriately be accommodated through understory planting and/or replacement of spruce pole fencing. Central to the character of the historic landscape, the borrowed view from Fairsted to the Green Hill parcel will be maintained through the management of volunteer trees and understory vegetation.

TREATMENT REFERENCE DATE

As outlined in the previous section, the historic period for the Green Hill parcel remains undefined. The parcel might appropriately be managed to reflect its character in association with the Green Hill Historic District (1889) or for its association with Fairsted—to preserve the historic setting of Fairsted and borrowed view from the Olmsted house (circa 1930). The scope of recommendations below does not vary based on the definition of the historic period for the Green Hill parcel, with the exception of one: replacement of the

southern segment of the spruce pole fence along Warren Street (see Task SSF-1). Since the Green Hill parcel was acquired by the National Park Service to preserve the setting of Fairsted, it is recommended that the Green Hill parcel landscape be maintained consistent with its appearance about 1930, the period to which the Fairsted landscape is treated and continuously managed.

TREATMENT ZONES

Treatment of the Green Hill parcel landscape employs three landscape treatment zones outlined below, with a sub-zone for the meadow. Throughout this treatment section, these zones are color coordinated on the planting palette (Figure 42), plans (Drawings 2 and 3) and sections (Drawings 4 and 5). These zones consist of the following areas, also described in Figure 34:

WOODLAND ZONE

The Woodland Zone (orange, approximately 1.4 acres) lies along the eastern perimeter of the parcel and in the vicinity of the Clark Sisters' Cottage. It is comprised of a canopy of mostly deciduous trees, with mixed native and exotic species and a lower understory.

SCREEN ZONE

The Screen Zone (yellow, approximately 0.5 acres) is proposed along the Warren Street frontage (along the far eastern edge of the Green Hill parcel) and along the southern property boundary to obscure views to and from the road to and from adjoining residences. It is comprised of a sub-canopy of mid-height trees and woody shrubs, along with lower herbaceous vegetation that is evocative of the historic buffer planting of rhododendron.

OPEN MEADOW AND FESCUE MEADOW ZONE

The Meadow Zones, open (light green, approximately 3.2 acres) and fescue (dark green, approximately 0.2 acres), extends across the core of the Green Hill parcel. The open meadow is comprised of grasses and wildflowers, with scattered deciduous specimen trees. The fescue meadow is proposed along the stone wall that separates Fairsted from the Green Hill parcel to preserve the open view from the South Lawn. This subzone is necessary, since species proposed for the open meadow mature significantly higher than fescue and would otherwise obscure views.



Figure 34. View of the embankment adjacent to the Gardner mansion, showing the woodland zone (top, orange), screen zone (middle, yellow), and meadow zone (bottom, green). View looking east, most likely 1900-05 (T.E. Marr and Son, *Green Hill*, Isabella Stewart Gardner Museum, Boston, annotated by OCLP).

TREATMENT TASKS

The narrative for each treatment task below includes a brief description of the issue that warrants treatment based on comparison of historic and existing conditions and additional factors for consideration, such as phasing and estimated cost for each task. Recommended treatment tasks for the Green Hill parcel are focused on two landscape characteristics, vegetation and small-scale features. Treatment recommendations respond to all known deferred maintenance needs for the landscape. Where no specific tasks are identified, preservation is recommended as the default treatment of existing features. Preservation, “the act or process of applying measures necessary to sustain the existing form, integrity, and materials or an historic property,” will prevent the loss of historic materials and/or spatial relationships, and ensure that historic features are protected in place. The treatment recommendations that follow are for work planning purposes only; additional design is required prior to physical work.

VEGETATION

Vegetation treatment tasks for the Green Hill parcel are divided into three management zones that reflect both planting and vegetation maintenance strategies. The zones are defined by their overarching character: woodland, screen, and open meadow, with a sub-area for fescue meadow (see Drawings 2 and 3) and respond to the desire to protect the historic view of Green Hill parcel from Fairsted and provide privacy for residences to the southwest of the Green Hill parcel. Viewshed management will be achieved through planting by rehabilitating the landscape with historic species or species that approximate the historic volume, massing, texture, and colors of historic plantings.

VG-1. Remove invasive understory species

Description: During Isabella Stewart Gardner’s lifetime (1840–1924), the bulk of the Green Hill parcel landscape consisted of a meadow with wildflowers flanked by rhododendrons and dotted with specimen trees (Figure 35). In the years since 1980, when the Gardner family donated the parcel as conservation land, it has been minimally managed, resulting in an infestation of invasive species (Figure 36). Nineteen different plants considered invasive in the Commonwealth of Massachusetts were recorded at Green Hill in June 2015. These include bishop’s goutweed (*Aegopodium podagraria* L.), garlic mustard (*Alliaria petiolata* (M. Bieb.) Cavara and Grande), and porcelain berry (*Ampelopsis brevipedunculata* (Maxim.) Trautv.) (refer to Table 1 for a complete list). These invasive species require a combination of manual and chemical treatments for eradication. Treatment methods vary depending on the target species and biotic factors, such as means of propagation, life-cycle, and growing season. Invasive plants require

Figure 35. Historic view down the embankment adjacent to the former Gardner mansion, depicting meadow quality with a dense planting of rhododendron on the right, as well as daises in the foreground. View looking east, most likely 1900-05 (T.E. Marr and Son, *Green Hill*, Isabella Stewart Gardner Museum, Boston).



Figure 36. View down the embankment adjacent to the former Gardner mansion showing a prevalence of invasive species in the foreground. View looking east, 2016 (OCLP).



treatment/removal to prepare the site for replanting (see Task VG-2). Specific recommendations under development by the Northeast Region Exotic Plant Management Team may be used to guide invasive species treatment work.

Considerations: Removing invasive plants from the site will require both treatment and monitoring. Many of the subject species can take multiple years to fully eradicate. In particular, Garlic mustard (*Alliaria petiolata* (M. Bieb.) Cavara and Grande), Oriental bittersweet (*Celastrus orbiculatus* Thunb.), Japanese knotweed (*Polygonum cuspidatum* Siebold and Zucc.), and multiflora rose (*Rosa multiflora* Thunb.) can all be expected to take several treatment applications over multiple years to remove.²⁷ Following preliminary treatment of the site, known areas of

infestation should be monitored throughout the subsequent growing season to discover areas where invasive plants are re-establishing and target further treatment in those areas.

Since there are a variety of invasive plant species to remove from the Green Hill parcel, several different methods of treatment will be required. Manual removal methods include hand pulling, mowing, and cutting. Hand pulling is effective for small infestations of non-rhizomatous species.²⁸ Hand cutting can be effective for annuals and biennials, provided that they are cut before their seeds mature.²⁹

Table 1. Invasive Species Treatment Methods*

Scientific Name	Common Name	Mechanical Treatment	Chemical Treatment with Systemic Herbicide
<i>Acer platanoides</i>	Norway maple	cutting, hand pulling	
<i>Aegopodium podagraria</i> L.	bishop's goutweed	hand pulling	cut stump/stem, targeted foliar
<i>Ailanthus altissima</i> (Mill.) Swingle	tree of heaven		cut stump/stem, targeted basal, targeted foliar
<i>Alliaria petiolata</i> (M. Bieb.) Cavara and Grande	garlic mustard	hand pulling	broadcast, targeted foliar
<i>Ampelopsis brevipedunculata</i> (Maxim.) Trautv.	Amur peppervine	hand pulling	broadcast, cut stump/stem, targeted foliar
<i>Aralia</i> L.	spikenard	hand pulling	broadcast, cut stump/stem
<i>Berberis thunbergii</i> DC.	Japanese barberry	hand pulling, repeated mowing/cutting	cut stump/stem, targeted foliar
<i>Celastrus orbiculatus</i> Thunb.	Oriental bittersweet		Cut stump/stem, targeted foliar
<i>Cirsium arvense</i> (L.) Scop.	Canada thistle		Broadcast
<i>Cynanchum louiseae</i> Kartesz and Gandhi	Louise's swallow-wort	hand pulling, repeated mowing/cutting	cut stump/stem, targeted foliar
<i>Euonymus alatus</i> (Thunb.) Siebold	burningbush	hand pulling, repeated mowing/cutting	cut stump/stem
<i>Frangula alnus</i> Mill.	Glossy buckthorn		Cut stump/stem, targeted basal, targeted foliar
<i>Glechoma hederacea</i> L.	ground ivy	hand pulling	broadcast
<i>Hedera helix</i> L.	English ivy	hand pulling	cut stump/stem
<i>Ligustrum</i> L.	privet	hand pulling	broadcast, cut stump/stem, targeted basal, targeted foliar
<i>Polygonum cuspidatum</i> Siebold and Zucc.	Japanese knotweed		Cut stump/stem, targeted foliar
<i>Rhamnus cathartica</i> L.	common buckthorn	hand pulling	cut stump/stem; targeted basal
<i>Rosa multiflora</i> Thunb.	multiflora rose	repeated mowing/cutting	cut stump/stem, targeted foliar
<i>Rubus phoenicolasius</i> Maxim.	wine raspberry	hand pulling	broadcast

*References for invasive plant control: Jil Swearingen, et al., *Plant Invaders of Mid-Atlantic Natural Areas*; Massachusetts Invasive Plant Advisory Group, *Strategic Recommendations for Managing Invasive Plants in Massachusetts* (Boston: MIPAG, 2005); Sandra Dingman, et al., *Invasive Plant Management Planning*.

Chemical removal of invasive plants is done through the application of herbicides. Herbicide selection should be made to target specific plant species. There are several methods of applying herbicides, four in particular that should be considered to treat the Green Hill parcel. Broadcast application of systemic herbicide can be effective in areas that are heavily infested, particularly after mowing. The cut stump method of treatment is a variant application of systemic herbicide, by which woody plants are cut and herbicide applied to the stump or cut stem by hand. Rhizomatous species should not be mowed, since new plants will grow from the root fragments. Foliar treatment (spraying herbicide on leaves) and basal bark applications can be used in areas that are not able to be mowed (refer to Table 1 for species specific treatment method recommendations).

Phasing: Mitigating invasive species should be completed first because the meadow planting cannot be rehabilitated before invasive species are eradicated. Invasive vegetation on Green Hill may also negatively impacts neighboring properties, including Fairsted.

Cost Estimate: To completely eradicate invasive understory species over an area of 5.31 acres, the approximate cost of a combination of mechanical and chemical treatment methods is approximately \$47,000.

VG.-2. Reestablish meadow grass and wildflower planting

Description: During the historic period, the embankment was characterized by a wildflower meadow dotted with specimen trees and edged with woody shrubs, as evidenced in photos of the site taken in the early twentieth century (Figure 37). As described in the previous treatment task, the site is currently infested with at least nineteen different invasive plant species (Figures 38 and 39). Removing invasive species and rehabilitating the meadow character of this landscape will not only improve the ecological health of this Green Hill parcel, but of Fairsted as well, since invasive materials can migrate. Reestablishment of the meadow character will also preserve the borrowed view from Fairsted and provide habitat for birds and small mammals (see Table 2 for a list of habitat values for meadow species). Additional species for dry meadow planting prepared by the Northeast Region Exotic Plant Management Team are provided in Appendix B.

Considerations: The soil at Green Hill will need to be stabilized immediately after treatment of invasive plant species to prevent new invasive plants from establishing in cleared areas.³⁰ This can be accomplished by applying a grass and wildflower seed mix over newly remediated patches of soil through broadcasting, drilling, or hydroseeding. However, since invasive remediation is a multi-year process, it is likely that certain areas will need to be seeded multiple times, especially if herbicide is used as part of the ongoing remediation process.

Figure 37. Historic view from upper end of the driveway down the embankment to Warren Street showing the meadow quality of landscape with flowering daises, rhododendron, and a horsechestnut at the right side of the image. View looking east, most likely 1900-05 (T.E. Marr and Son, *Green Hill*, Isabella Stewart Gardner Museum, Boston).



Figure 38. View down the embankment showing invasive species in the foreground, as well as Warren Street in the background. View looking east, 2016 (OCLP).



Figure 39. Photosimulation showing the reestablished meadow planting and specimen trees. Vista marked B on Drawings 2 and 3. Proposed view looking east, 2016 (OCLP).



Seed mixes that include native grasses and wild flowers such as black-eyed Susan (*Rudbeckia hirta*), coneflower (*Echinacea purpurea*), switchgrass (*Panicum virgatum*), little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*), and Indiangrass (*Sorghastrum nutans*) should be selected for the meadow rehabilitation. Some of the desirable herbaceous plants are already growing on site are wood aster (*Eurybia divaricate*), yellowroot (*Xanthorhiza simplicissima*), goldenrod (*Solidago* sp.), and Queen Anne's lace (*Daucus carota*). The area immediately south of Fairsted should be planted with a fine fescue (*Festuca* sp.), which is a low maintenance turf with a creeping habit. This will ensure that the viewshed from Fairsted is not obscured by taller grasses between mowings.

During the first growing season after application, the meadow should be mowed whenever its height exceeds 24 inches.³¹ This will allow the grasses to outcompete weeds. The meadow should not be mowed to a height lower than 8 inches. After the first growing season, the meadow will need to be mowed less frequently, and only outside of nesting season, which is April to August.

Table 2. Grasses and Wildflowers*

Scientific Name	Common Name	Habitat Value
<i>Andropogon gerardii</i> 'Niagara'	big bluestem 'Niagara'	bird, mammal, pollinator
<i>Agrostis perennans</i>	autumn bentgrass	bird, mammal
<i>Asclepias tuberosa</i>	butterfly milkweed	insect, pollinator
<i>Aster laevis</i>	smooth blue aster	mammals, pollinator
<i>Aster novae-angliae</i>	New England aster	bird, mammal, pollinator
<i>Baptisia australis</i>	blue wild indigo	bird, mammal, pollinator
<i>Bouteloua curtipendula</i> 'Butte'	side-oats grama 'Butte'	bird, mammal
<i>Chamaecrista fasciculata</i>	partridge pea	bird, mammal, pollinator
<i>Echinacea purpurea</i>	eastern purple coneflower	pollinator
<i>Elymus virginicus</i>	Virginia wildrye	bird, mammal, pollinator
<i>Heliopsis helianthoides</i>	smooth oxeye	pollinator
<i>Liatris spicata</i>	marsh blazing star	pollinator
<i>Monarda fistulosa</i>	wild bergamot	bird, pollinator
<i>Panicum virgatum</i> 'Shelter'	switchgrass 'shelter'	bird, mammal, pollinator
<i>Penstemon digitalis</i>	tall white beardtongue	pollinator
<i>Pycnanthemum incanum</i>	hoary mountainmint	pollinator
<i>Rudbeckia hirta</i>	black-eyed Susan	bird, mammal, pollinator
<i>Rudbeckia triloba</i>	brown-eyed Susan	bird
<i>Schizachyrium scoparium</i>	little bluestem	bird, mammal, pollinator
<i>Senna hebecarpa</i>	wild senna	bird, pollinator
<i>Senna marilandica</i>	Maryland senna	bird, mammal, pollinator
<i>Solidago juncea</i>	early goldenrod	pollinator
<i>Sorghastrum nutans</i>	Indiangrass	bird, mammal, pollinator
<i>Tradescantia ohiensis</i>	Ohio spiderwort	pollinator

*United States Department of Agriculture, "Technical Publications: Plant Fact Sheets," *Natural Resources Conservation Service Plant Materials Program*, accessed July 18, 2016, <http://www.nrcs.usda.gov/wps/portal/nrcs/main/plantmaterials/technical/publications/>

Phasing: Seeds should be broadcast to stabilize remediated areas immediately after treating for invasives. The meadow will probably take several growing seasons to fully establish.

Cost Estimate: The cost of reestablishing meadow grass and wildflowers over an area of 3.8 acres is approximately \$15,000–\$20,000.

VG-3. Remove Norway maples

Description: The view from the Fairsted Conservatory and South Lawn into the former Gardner property was devised by Frederick Law Olmsted, Sr. as part of his original design for Fairsted. The meadow and specimen trees of Green Hill provided the backdrop for the Olmsted elm and South Lawn throughout Fairsted's period of significance. Presently, the view is obstructed by volunteer Norway maples (*Acer platanoides*) that are growing along the boundary between the two parcels (Figure 40). Ideally, a 25-foot opening between canopy trees should be maintained to preserve this historic view between properties. Removing the Norway maples along the Green Hill boundary will help to maintain this viewshed (Figure 41). Drawing 4 provides a section illustrating the change in character following removal of the non-historic Norway maples that obstruct views from the Conservatory to the Green Hill parcel. Refer to Drawing 7 for a tree removal plan.

Considerations: Since Norway maples are invasive plants that regenerate quickly and outcompete other species, it is advisable to eliminate them from the Green Hill parcel. There is precedent at Frederick Law Olmsted National Historic Site for removing Norway maples and other volunteer tree species. The park completed a similar invasive tree species removal project in 1994 to re-establish the character of South Lawn and West Slope.³²

Norway maples are non-contributing vegetation and adversely affect the growth of other species, including understory growth, since they are allelopathic. If left in place, Norway maples may have a negative impact on the meadow rehabilitation effort at Green Hill. Furthermore, Norway maple seedlings spread quickly and may invade the Fairsted property, creating an ongoing maintenance problem. While less prolific, the other principal invasive tree species recorded on the parcel, tree of heaven (*Ailanthus altissima*), should also be removed.

Beyond the invasive and allelopathic qualities of Norway maple, their susceptibility to Asian Long-horned Beetle (ALB) is yet another reason to remove them from the parcel. ALB is mainly attracted to maples, but will also attack other trees including elms and birches, of which there are contributing species at Fairsted. The removal of this non-contributing vegetation will reduce the available habitat for this pest on the parcel.



Figure 40. View from Fairsted's south lawn into the former Gardner property. Image depicts obstruction of the viewshed by *Acer platanoides* (Norway maple). View looking north, 2016 (OCLP).



Figure 41. Photosimulation showing the reestablished view to the former Gardner property from the South Lawn of Fairsted. Visata marked A on Drawings 2 and 3. Proposed view looking north, 2016 (OCLP).

Larger Norway maple specimens will need to be cut down. The stumps can be wrapped in burlap to discourage regeneration through suckers. Saplings can be manually removed through hand pulling or with tools. During manual removal it is important to extract the entire root system. Wetting soil before manual extraction can aid in extracting the root system.

Phasing: Sapling removal will be ongoing and concurrent with the removal of the invasive understory. Removal of mature Norway maples on the Green Hill parcel may be completed at the same time as forthcoming tree removal/replacement on the Fairsted property, including the declining birch near Clark Sisters' Cottage.

Cost Estimate: The cost of removal of 79 Norway maples and 3 tree of heaven of various sizes, including clearing, grubbing, and off-site disposal is approximately \$78,000.

VG-4. Replace missing specimen trees

Description: During the historic period for Green Hill, specimen trees were scattered along the hillside and clustered along the eastern boundary of the site. However, the canopy cover was discontinuous even in this area and allowed light to penetrate the understory. During this time, the canopy was dominated by a mix of native and exotic species. Some notable specimens remain that include European beech (*Fagus sylvatica*), red oak (*Quercus rubra*), tulip poplar (*Liriodendron tulipifera*), American linden (*Tilia americana*), and sugar maple (*Acer saccharum*). The canopy of the Green Hill parcel is now dominated by Norway maples (*Acer platanoides*) and white pine (*Pinus strobus*). The removal of Norway maples (discussed above) will do much to restore the historic character of the parcel's woodland; however, replacement of missing specimen trees and maintenance of existing, historic specimen trees is necessary to perpetuate the historic character of the Green Hill parcel. While a summary of appropriate species is provided in Figure 42, additional design and planning is necessary to execute this recommendation.

Considerations: Existing stands of non-historic trees in the woodland zone will need to be selectively cleared to approximate the canopy from the historic period, maintain viewsheds, and allow light to filter to the understory (see Drawings 4–6). In addition to planting new specimens, selecting existing volunteers to become new specimen trees is an economical way to restore the Green Hill landscape. Some volunteer trees and saplings aid in rehabilitating the historic character of the landscape because they are known to have grown on the site during the historic period (such as beeches and sugar maples) or because they are species shared with Fairsted (such as red oak and tulip poplar). Other volunteer specimens might

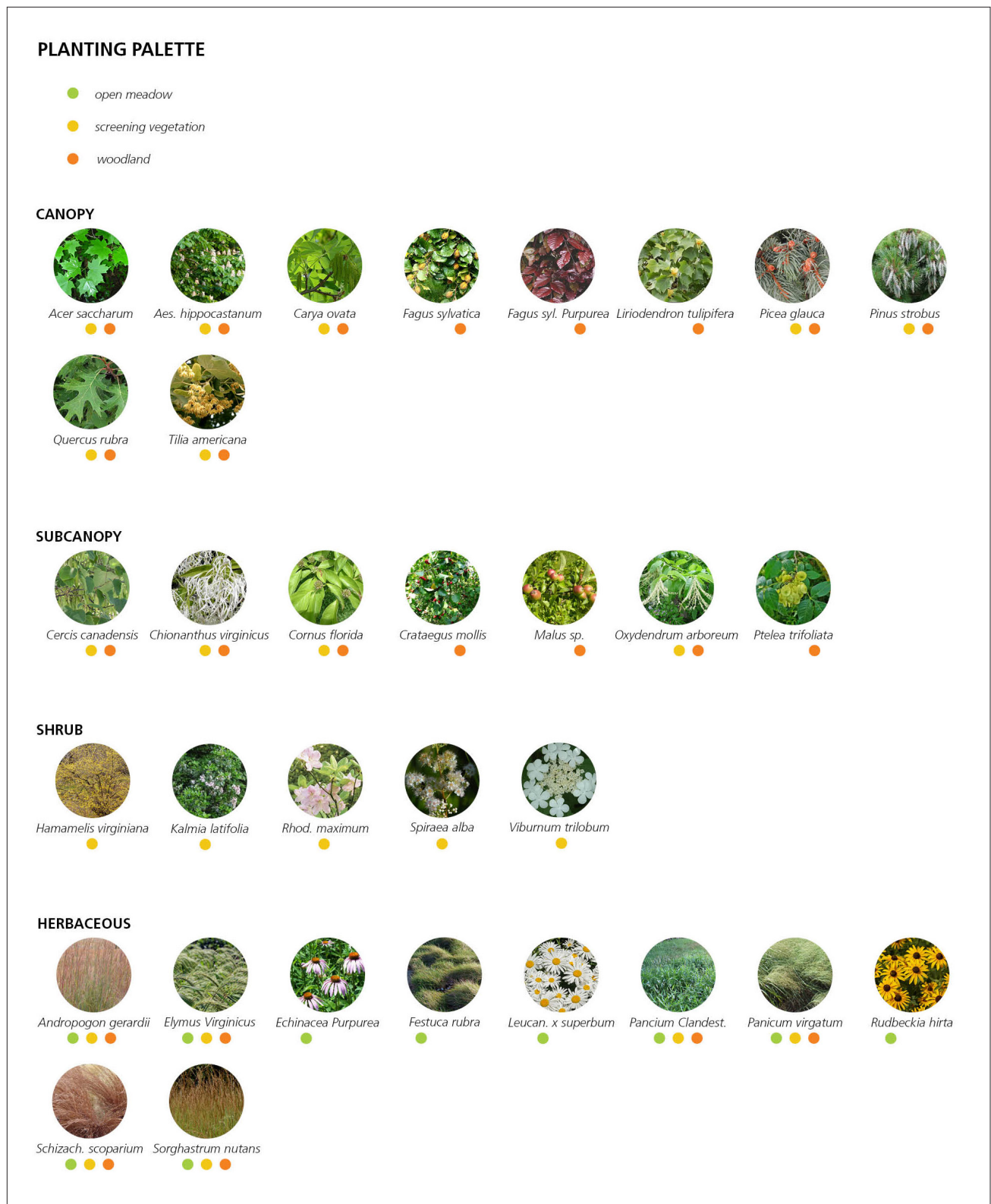


Figure 42. Planting palette for rehabilitation planting in vegetation management zones identified on Drawings 2 and 3. Note that each species is color coded to one of more zones, 2016 (OCLP).

appropriately be maintained because they approximate the character of trees known to have grown on the property historically (American lindens, for example, share a similar growth habit to silver lindens).

In some instances, though, it is necessary to plant new trees to replace missing historic specimens. This is true in areas where photographic evidence shows more canopy cover than currently can be achieved through salvaging volunteer trees. This is also the case where re-introduction of species is necessary to replace trees known to have grown on the site historically, such as purple beech (*Fagus sylvatica purpurea*), which was found on the site during the period of significance, but is no longer extant.

Along the Warren Street frontage, the woodland area will consist of canopy trees spaced far enough apart to allow light to filter through their foliage, permitting development of a healthy understory. This woodland zone should be maintained along the eastern perimeter of the Green Hill parcel to capture the c. 1900 character of the dense border of woody canopy trees that adjoined the more open meadow area. Refer to Drawing 8 for a restoration planting plan.

Phasing: Selected volunteer trees may be removed at the same time as the mature Norway maples are cleared from the site. If this is cost prohibitive, these removals can take place after the Norway maples have been removed. New specimen trees should be installed after tree removals are complete and the meadow planting has been reestablished.

Cost Estimate: The cost of replacing eight specimen trees at 2 ½ to 3-inch caliber is approximately \$8,000.

Figure 43. View along entrance drive, on the southern edge of the parcel, towards the former Gardner mansion driveway. *Tsuga canadensis* (Canadian hemlock) are visible in background and are used for privacy screening. View looking north, 2016 (OCLP).



VG-5. Phase-out Canadian hemlocks

Description: While the exact planting date of the Canadian hemlocks (*Tsuga canadensis*) is not known, they do not appear in historic images from about the turn of the twentieth century. It is likely that they were added late in the Gardner family's ownership to screen views. Canadian hemlocks on the southern edge of the parcel act as a useful privacy screen for the residential drive beyond the park's boundaries. However, these hemlocks are disease-prone and currently require monitoring and treatment for woolly adelgid and spider mites (Figure 43). Since some of these hemlocks are showing noticeable signs of decline and are non-contributing, it will be better for long-term maintenance to phase this species out of the Green Hill parcel and replace them with trees that have a similar character.

Considerations: The Canadian hemlocks growing along the southern edge of the Green Hill parcel should be phased out as part of an effort to control the spread of woolly adelgid. Some of these hemlocks are already in decline and should be prioritized for the first round of replacements. There are ten hemlocks to be replaced. To minimize the visual impact of replacement, existing trees might be replaced in small groups of two or three over a period of ten years. The Canadian hemlocks might appropriately be replaced with conifers that have similar growth habit and leaf formation such as white spruce (*Picea glauca*), red spruce (*Picea rubens*), or balsam fir (*Abies balsamea*). Chinese hemlock (*Tsuga chinensis*) is comparable to Canadian hemlock and is woolly adelgid resistant. However, this species is not yet available through the nursery trade. As Chinese hemlocks are released by nurseries, they should be considered for substitute planting.

The continued monitoring and treatment for woolly adelgid and other tree-born pests (such as Asian Longhorn Beetle and Emerald Ash Borer) and diseases will be imperative, not only for the health of the Green Hill parcel canopy, but for the whole historic site and the surrounding neighborhood.

Flowering dogwood (*Cornus florida*) are also disease-prone, being susceptible to both anthracnose and powdery mildew. There are currently twelve dogwoods on the Green Hill parcel that should be monitored for these maladies and should be treated if found to be impacted. The high number of white pines on the site could also be problematic if the spread of pine bark beetle continues throughout New England. These trees will need to be monitored for signs of infestation.

Phasing: The Canadian hemlock removal and replacement (with substitute species) will be ongoing for a period of ten years, but should be prioritized after invasive species removal and meadow rehabilitation.

Cost Estimate: The cost of removing, grubbing, and disposing of ten mature Canadian hemlocks and replacing with compatible evergreen species is approximately \$14,000.

VG-6. Establish screen planting along Warren Street

Note: Providing compatible screening along Warren Street might appropriately be achieved by planting a vegetative screen along the north side of the stone wall, by replacing the spruce pole fence that lined the top of the stone wall (in full) after 1900, or by some combination of the two. Tasks VG-6 and SSF-1 (and associated Drawings 2 and 3) reflect two different approaches to screening. Task VG-6 (Drawing 2) entails the use of understory vegetation to create a dense screen along the wall and at the crest of the embankment. Task SSF-1 (Drawing 3) entails replacement of the spruce pole fence along the entire length of the stone wall. Accordingly, corresponding sections provided in Drawings 5 and 6 illustrate these alternate approaches to screening. Drawing 9 provides a detailed screen planting plan, with appropriate plant species and quantities.

Description: After 1900, Green Hill was screened from Warren Street both by a spruce pole fence and a dense border of rhododendrons. Both features are seen in T.E. Marr's photographs of the site. Currently, only a portion of the spruce pole fence remains. It is insufficient in creating a screen along Warren Street. There are currently no rhododendrons growing along the perimeter of the site, which is characterized by a dense tree canopy. Restoring the vegetation screen offers the opportunity to enhance the historic character of the site and provide more privacy for the residents to the west of the Green Hill parcel.

Considerations: Vegetation might appropriately be planted adjacent to the stone wall (refer to Figure 39) and at the crest of the embankment to provide a sense separation from Warren Street (Figures 44 and 45). Vegetation within the screen planting zone (refer to Drawing 2) will primarily be made up of low branching sub-canopy trees and shrubs that grow between 3 and 15 feet high (also see Drawings 5 and 6). The screen will have the benefit of enhancing the privacy of residents adjacent to Green Hill and can also enhance the ecosystem services of the site. Shrubs and small trees on the Green Hill parcel can provide habitat for animals that are already known to live in Brookline, such as small mammals and migratory birds.³³

The planting palette for the screen is derived both from what is known to have grown on site during the historic period, as well as vegetation that exists on the Fairsted property and matches the massing of plants that existed during the historic period on the Green Hill parcel (refer to Figure 34). Shrubs and small trees that are found on the Fairsted property and included in the Green Hill planting palette are crabapple (*Malus* sp.), downy hawthorn (*Crataegus mollis*), mountain laurel (*Kalmia latifolia*), meadowsweet (*Spiraea alba*), and rosebay rhododendron (*Rhododendron maximum*).

In order to rely on only vegetation to screen Warren Street, plants along the stone wall will need to be at least 8 feet tall. Planting might also take advantage



Figure 44. View along the former Gardner mansion entrance drive showing the area to be planted with a dense screen of shrubs to obscure views of Warren Street if the spruce pole fence is not replaced. View looking south, 2016 (OCLP).

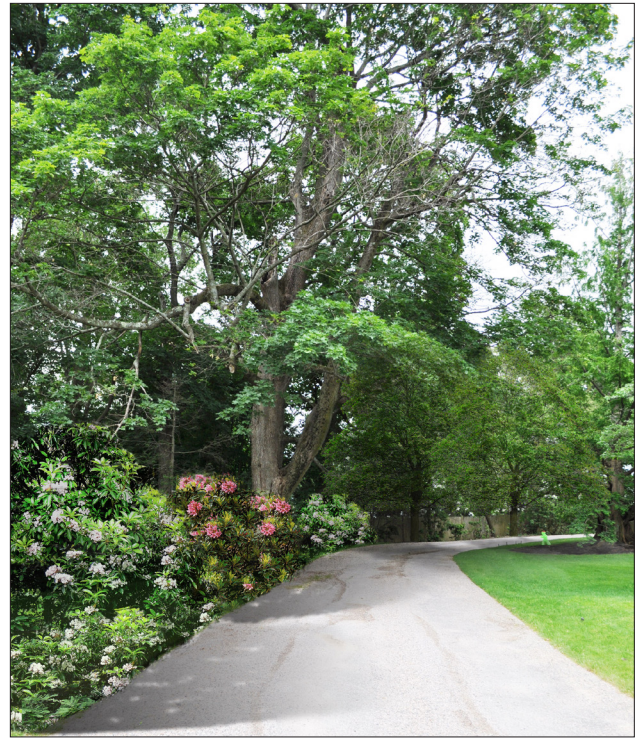


Figure 45. Photosimulation of rhododendron planting along the former Gardner mansion entrance drive to obscure views to Warren Street. Vista marked C on Drawings 2 and 3. Proposed view looking south, 2016 (OCLP).

of the slight rise in topography near the bend in Warren Street to enhance the effectiveness of the vegetative screen. Rhododendrons are ideal, since they grew along the border historically. However, rhododendrons are very slow growing, typically gaining less than 1 foot per year. Mountain laurel, although similar in appearance to rhododendron is also slow growing. Faster growing shrubs should be interspersed with rhododendrons to establish the desired privacy screen more quickly. Mock orange (*Philadelphus L.*), bayberry (*Myrica pensylvanica*), witch hazel (*Hamamelis virginiana*), and highbush cranberry (*Viburnum trilobum*) are all faster growing alternatives to the rhododendron. However, shrub plantings will take several years to establish a high vegetation screen. In light of this, combining spruce pole fencing with a vegetation screen is the most expedient way to screen the site from Warren Street (refer to Task SSF-1). Refer to Drawing 9 for a screen planting plan.

Phasing: The vegetation screen should be planted as soon as possible after invasive species are eradicated from site. This is especially true if vegetation alone will be used to screen the site from Warren Street.

Cost Estimate: The cost of removal of deteriorated fence with extensive screen planning is approximately \$46,000 to \$60,000, depending upon the desired density of screen planting.



Figure 46. View of fallen spruce pole fence section along Warren Street. View looking north, 2016 (OCLP).

SMALL-SCALE FEATURES

Small-scale features on the Green Hill parcel are limited to sections of spruce pole fence and stockade fence and the stone wall along the parcel's Warren Street frontage. Treatment of these features will enhance the historic character of the parcel, while providing compatible screening to improve privacy for adjacent residents and define property lines.

SSF-1. Replace spruce pole fence along Warren Street

Description: Prior to 1900, the stone wall was all that separated the Green Hill estate from carriage traffic along Warren Street. After about 1900, Green Hill was screened from Warren Street both by a spruce pole fence and a dense border of rhododendrons. Both features are seen in T.E. Marr's photographs of the site. Currently, only 242 linear feet of spruce pole fence remain (out of the historic extent of 850 linear feet). While some of the spruce pole fence was replaced with stockade fence in the late twentieth century, neither the remaining spruce pole fence nor the stockade fence is sufficient to create a screen along Warren Street (Figure 46). Restoring the spruce pole fence would serve to rehabilitate the historic character of the property boundary and provide more privacy for the residents to the west of the Green Hill parcel.

Considerations: The spruce pole fence is first evidenced in historical photographs from just after the turn of the twentieth century. The fence was supported by rebar posts set into the stone wall at approximately 8 feet on center. Two horizontal stringers support peeled spruce logs 1.25" to 1.5" in diameter set 2.25" to 3" on center and vertically to a height of 5 feet. On account of poor stability provided by the rebar set into the wall, bracing was installed behind the portions of the fence after the National Park Service acquired the property to prevent further



Figure 47. View down the embankment showing invasive species in the foreground, as well as a view of the Warren Street in the background. View looking east, 2016 (OCLP).



Figure 48. Photosimulation showing the reestablished meadow planting, specimen trees and spruce pole fence along the low stone wall that borders Warren Street. Vista marked B on Drawings 2 and 3. Proposed view looking east, 2016 (OCLP).

loss. Replacement of the spruce pole fence, set to a height of 5 feet, will effectively screen the Green Hill parcel from the adjoining road, while reestablishing the post-1900 character of the landscape (refer to Drawings 3, 5, and 6; Figures 47 and 48). Drawing 10 provides a schematic detail for construction of a replacement spruce pole fence on top of the stone wall. This detail shows the use of metal brackets to attach the fence posts to the wall at approximately 8' on center (eliminating the need for rear bracing) and the installation of two stringers on which to attach the spruce pole pickets.

Recognizing that vehicular and pedestrian safety along Warren Street is essential, a break in the fence may be required to afford views for vehicles as they travel around the bend. In this case, the area to the west of the break in the fence should be planted densely to obscure views of Warren Street from adjacent residences. Alternatively, the fence may be replaced in full, with a convex mirror mounted on a nearby utility pole, as exists elsewhere along Warren Street.

Phasing: Although a fence will be more expensive to install than a vegetative screen, it will be immediately effective. Fencing may also be replaced in phases according to budget.

Cost Estimate: The cost of replacing 850 linear feet of spruce pole fence and installing limited screen planting is approximately \$65,000 to \$85,000.

SSF-2. Repair stone wall along Warren Street

Description: The stone wall along Warren Street is likely the oldest landscape features on the site. Along its southern extent, the wall is retaining, supporting a portion of Warren Street. By the turn of the twentieth century, the wall was well documented in historic photographs. The stone wall extends approximately 850 feet along Warren Street, and varies in height from 16-inches to 36-inches above grade. The wall is composed of dry-laid Roxbury puddingstone and is held together with mortar. Portions of the wall are deteriorated and in need of repair and repointing (Figure 49). Repair of the stone wall along Warren Street is a critical in maintaining the historic character of the Green Hill parcel and will aid in visitor understanding of the site. If the spruce pole fence that once stood on top of the wall is replaced, the repair of the wall is also essential to provide a foundation for the fence. The National Park Service Historic Preservation Training Center inspected the wall on May 11, 2015 and provided a cost estimate for its repair.

Considerations: The portions of the wall that has shifted over time will be dismantled and re-laid. The joints should be tuck pointed to match existing historic mortar joints. Vegetation along the wall should be removed, and the entire wall should be treated with D/2 biological solution to prevent further deterioration and improve appearance. The recommended preservation

Figure 49. View of stone wall along Warren Street, looking toward the former Gardner mansion. View looking west, 2016 (OCLP).



treatments for the repair and restoration of the stone wall will be done within the Secretary of Interior's Standards for Treatment of Historic Properties. As outlined by the Historic Preservation Training Center, tasks associated with repair of the stone wall include:

- Mobilization, site staging, documentation and demobilization
- Dismantling and re-laying of portions of the wall
- Removal and re-pointing of failed mortar joints
- Removal of vegetation
- Application of D/2 biological solution

After the vegetation on and along the wall has been removed, the strip of land between the wall and Warren Street needs to be planted to inhibit growth of vegetation that might damage the repaired wall and to discourage littering along this part of the property. Options for the border planting include *Pachysandra* (*Pachysandra terminalis*), which is currently planted on the easement outside of the entrance gates. An alternative would be to plant a mix of fine fescues (*Festuca* sp.) that could be established with the same seed mix used for the fescue portion of the meadow detailed in task VG-2. If taller grasses are desired for the border

Table 3. Salt Tolerant Grasses for Border Planting

Scientific Name	Common Name	Height Range (unmown)
<i>Andropogon gerardii</i>	big bluestem	5-7'
<i>Bouteloua curtipendula</i>	side oats grama	2-3'
<i>Elymus canadensis</i>	Canadian wild rye	3-6'
<i>Schizachyrium scoparium</i>	little bluestem	2-3'
<i>Tridens flavus</i>	purple top	4-5'

planting, there are a variety of salt tolerant species listed in Table 3. These grasses would be similar to the meadow grasses planted inside of the wall, but could be mown more frequently so that they do not obscure the stone wall, which ranges in height from 16–36.”

Phasing: Removal of vegetation on stone wall should be done immediately. Repair of the stone wall may be completed in phases, as budgets allow.

Cost Estimate: The Historic Preservation Training Center provided a cost estimate of \$85,700 for the tasks described above. However, this estimate relates to treatment of 400 yards (1,200 linear feet) of stone wall. Since the wall only extends approximately 850 linear feet, this estimate may need to be adjusted. Simply prorated (based on length), the total project cost may be approximately \$61,000.

CLASS C COST ESTIMATE SUMMARY

The following Class C cost estimate was developed by the Olmsted Center using RS Means and CESS, the cost estimating tool from the NPS Facility Management Software System. This estimate is intended to provide a point of reference for project feasibility, not for submitting funding requests. For all tasks, with the exception of repair of the stone wall along Warren Street, additional design and planning work is needed.

Table 4. Class C Cost Estimate Summary

Task		Estimated Cost	Cost Source
VG-1. Remove invasive understory species		\$47,000	CESS
VG-2. Reestablish meadow grass and wildflower planting		\$15,000–\$20,000	CESS
VG-3. Remove Norway maples		\$78,000	CESS
VG-4. Replace missing specimen trees		\$8,000	CESS and RS Means
VG-5. Phase-out Canadian hemlocks		\$14,000	CESS and RS Means
A. or	VG-6. Establish screen planting along Warren Street	\$46,000–\$60,000	CESS and OCLP
B.	SSF-1. Replace spruce pole fence along Warren Street	\$65,000–\$85,000	RS Means and OCLP
SSF-2. Repair stone wall along Warren Street		\$61,000–\$85,700	Prorated HTPC estimate
Additional design and construction administration services to be procured through a licensed landscape architect		\$30,000–\$50,000	OCLP
Estimated Subtotal		\$299,000–\$377,700	
Contingency (15%)		\$44,850–\$56,655	
Estimated Total		\$343,850–\$434,355	

TREATMENT IMPLEMENTATION

Treatment tasks described in this report can be broadly grouped into a preliminary phase of treatment and a secondary phase of treatment. The preliminary phase of treatment consists of initiating or completing tasks:

- VG-1. Remove invasive understory species (see Tables 5 and 6, Appendix A)
- VG-2. Reestablish meadow grass and wildflower planting (see Appendix B)
- VG-3. Remove Norway maples
- SSF-2. Repair stone wall along Warren Street

Removal of the invasive herbaceous species can begin in September 2016 and extend through October 2016. For detailed information about treatment of invasive species, refer to the “Frederick Law Olmsted 2016 Exotic Plant Treatment Plan” developed by the NPS Northeast Region Exotic Plant Management Team (Appendix A). Once weed removal efforts are complete for the year, the meadow can be seeded beginning in November 2016 (Appendix B). Norway maples can be removed alongside the removal of invasive herbaceous plants in September and October. Repair of the stone wall will need to be coordinated with the NPS Historic Preservation Training Center (HPTC). After their work on the wall is complete, border plantings between the stone wall and Warren Street can be established.

The secondary phase of treatment will consist of continued monitoring for invasive species and the overall health of the restored meadow, as well as tasks that require the services of a licensed landscape architect. These tasks include the completion of design and construction documents for:

- VG-4. Replace missing specimen trees
- VG-5. Phase-out Canadian hemlocks
- SSF-1. Replace spruce pole fence along Warren Street or
- VG-6. Establish screen planting along Warren Street

In addition to design services requirements, treatment tasks must also be sequenced in response to each other. The following table illustrates the relationships between treatment tasks and considerations in phasing physical work.

Table 5. September Invasive Species Removal

Scientific Name	Common Name
September Invasive Species Removal	
<i>Acer platanoides</i>	Norway maple
<i>Ailanthus altissima</i>	tree of heaven
<i>Ampelopsis brevipedunculata</i>	porcelain-berry
<i>Arctium minus</i>	common burdock
<i>Berberis thunbergii</i>	Japanese barberry
<i>Celastris orbiculatus</i>	Oriental bittersweet
<i>Phellodendron amurense</i>	Amur cork-tree
<i>Rhamnus cathartica</i>	common buckthorn
October Invasive Species Removal	
<i>Acer platanoides</i>	Norway maple
<i>Aegopodium podagraria</i>	goutweed
<i>Allaria petiolata</i>	garlic mustard
<i>Cynanchum louiseae</i>	black swallow-wort
<i>Euonymus alatus</i>	burning bush
<i>Hieracium pratense</i>	hawkweed/nuisance weed
<i>Ranunculus ficaria</i>	buttercup or lesser celandine
<i>Rubus</i> sp.	wineberry

Table 6. Treatment Task Relationships

Task A	Task B	Relationship	Timing
VG-1. Remove invasive understory species	VG-2. Reestablish meadow grass and wildflower planting	Invasive understory species must be removed prior to reestablishment of the meadow. Park staff, working with the regional exotic plant management team, can accomplish most of this work by hand or the work can be contracted. As invasives are removed, treatment areas require reseeding to limit erosion and runoff potential. The process of invasive removal and reseeding will need to be repeated over several seasons to establish a meadow capable of out competing invasives.	Fall or spring
VG-3. Remove Norway maples	VG-4. Replace missing specimen trees	In many areas, Norway maples must be removed prior to establishment of missing specimen trees. Smaller Norway maples can be removed by park staff, while larger trees (greater than 6" DBH) require an arborist contract for removal. Debris should be chipped on site or removed from the parcel.	Removal: Year-round Planting: Spring or fall
SSF-2. Repair stone wall along Warren Street	SSF-1. Replace spruce pole fence or VG-6. Establish screen planting along Warren Street	The stone wall along Warren Street must be repaired, repointed, and vegetation removed prior to replacement of the spruce pole fence. Timing of the wall repair is depends upon HPTC availability, but is not possible over winter months, since most grout can not be applied in cold weather. HTPC might appropriately also be contracted to construct the replacement fence, ensuring that the installation of fence posts is sympathetic with wall repairs. Alternatively, screen planting will require design services by a landscape architect prior to bidding and contracting installation.	Wall repair: Spring, summer, or fall Fence replacement: Spring, summer, or fall Screen planting: Spring or fall

Cultural Landscape Report
Green Hill Parcel
Frederick Law Olmsted
National Historic Site
Brookline, Massachusetts
Treatment Plan
Option 2



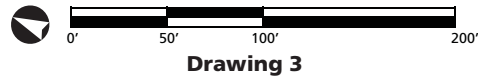
National Park Service
Olmsted Center for Landscape Preservation
www.nps.gov/oclp

- SOURCES**
- 1. Bryant Associates Survey, 1999
 - 2. MEA Partial Topographic Survey, 2006
 - 3. Aerial Photograph, MassGIS, 2009

DRAWN BY
Adrine Arakelian (2011), Shanasia Sylman (2015), Angelina R. Jones (2016), and Chris Beagan (2015), OCLP
AutoCAD Map 3D, Photoshop CS5, Illustrator CS5

- LEGEND**
- Proposed Vegetation Zone Boundary
 - Olmsted NHS Building
 - Other Building
 - Deciduous Tree
 - Evergreen Tree
 - Tree to be Removed
 - Proposed Canopy Tree
 - Shrub
 - Lawn / Groundcover
 - Asphalt / Bituminous Concrete Road
 - Stonedust Drive / Walk
 - Proposed Fence on Stone Wall
 - Ledge

- NOTES**
- 1. Contour Interval = 5'-0"
 - 2. All features shown in approximate scale and location.



Cultural Landscape Report
Green Hill Parcel
Frederick Law Olmsted
National Historic Site
Brookline, Massachusetts
Treatment Plan
Option 1



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- SOURCES**
- 1. Bryant Associates Survey, 1999
 - 2. MEA Partial Topographic Survey, 2006
 - 3. Aerial Photograph, MassGIS, 2009

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AutoCAD Map 3D, Photoshop CS5, Illustrator CS5

- LEGEND**
- Proposed Vegetation Zone Boundary
 - Olmsted NHS Building
 - Other Building
 - Deciduous Tree
 - Evergreen Tree
 - Tree to be Removed
 - Proposed Canopy Tree
 - Shrub
 - Lawn / Groundcover
 - Asphalt / Bituminous Concrete Road
 - Stonedust Drive / Walk
 - Stone Wall
 - Ledge

- NOTES**
- 1. Contour Interval = 5'-0"
 - 2. All features shown in approximate scale and location.



Section 1
Fairsted Viewshed



National Park Service
Olmsted Center for Landscape Preservation
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SOURCES

1. Bryant Associates Survey, 1999
2. MEA Partial Topographic Survey, 2006
3. Aerial Photograph, MassGIS, 2009

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Adobe Photoshop, 2016

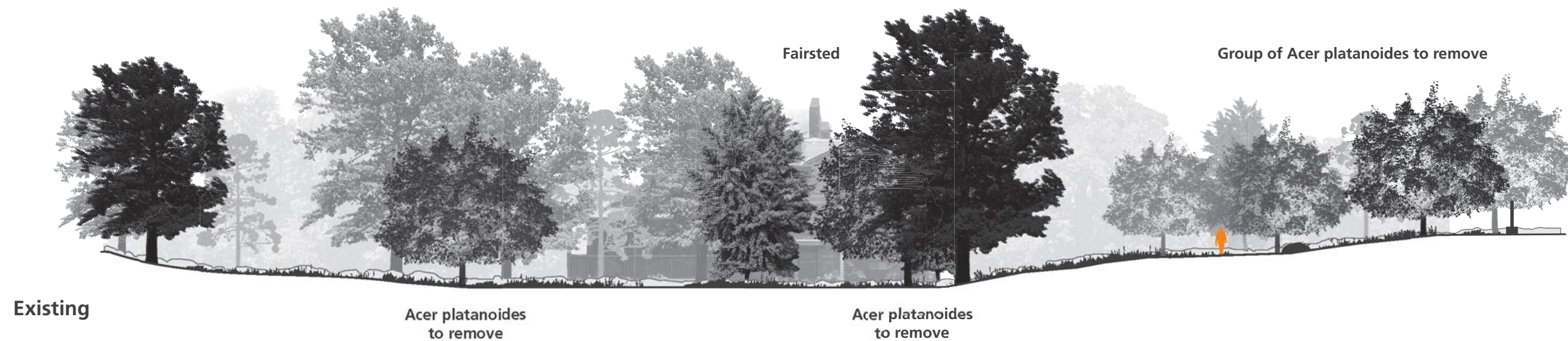
- Zone 1: Woodland
- Zone 2: Screen
- Zone 3a: Open Meadow
- Zone 3b: Fescue Meadow

NOTES

1. All features shown in approximate scale and location

Scale as Noted

Drawing 4



5 25 50 feet

Section 2
Screening Options



National Park Service
Olmsted Center for Landscape Preservation
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- SOURCES**
- 1. Bryant Associates Survey, 1999
 - 2. MEA Partial Topographic Survey, 2006
 - 3. Aerial Photograph, MassGIS, 2009

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Angelina R. Jones, AutoCAD Map 3D, Adobe Illustrator,
Adobe Photoshop, 2016

- Zone 1: Woodland
- Zone 2: Screen
- Zone 3a: Open Meadow
- Zone 3b: Fescue Meadow

NOTES

- 1. All features shown in approximate scale and location

Scale as Noted

Drawing 5



Section 2 Enlargement Screening Options



National Park Service
Olmsted Center for Landscape Preservation
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SOURCES

1. Bryant Associates Survey, 1999
2. MEA Partial Topographic Survey, 2006
3. Aerial Photograph, MassGIS, 2009

DRAWN BY

Angelina R. Jones, AutoCAD Map 3D, Adobe Illustrator,
Adobe Photoshop, 2016

NOTES

1. All features shown in approximate scale and location

Scale as Noted

Drawing 6

Existing



Option 1: Screen Planting



Option 2: Spruce Pole Fence



5 25 feet

Cultural Landscape Report
Green Hill Parcel
Frederick Law Olmsted
National Historic Site
Brookline, Massachusetts
Removal Plan
Canopy & Subcanopy Trees



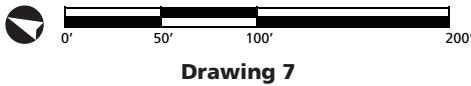
National Park Service
Olmsted Center for Landscape Preservation
www.nps.gov/oclp

SOURCES
1. Bryant Associates Survey, 1999
2. MEA Partial Topographic Survey, 2006
3. Aerial Photograph, MassGIS, 2009

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Adrine Arakelian (2011), Shanasia Sylman and Chris Beagan (2015), Melissa Eloshway (2017), OCLP
AutoCAD Map 3D, Photoshop CS5, Illustrator CS5

- LEGEND
- Olmsted NHS Boundary
 - Olmsted NHS Building
 - Other Building
 - Tree to be Removed
 - Lawn / Groundcover
 - Asphalt / Bituminous Concrete Road
 - Stonedust Drive / Walk
 - Stone Wall
 - Ledge

NOTES
1. Contour Interval = 5'-0"
2. All features shown in approximate scale and location.



Key	Qty	Scientific Name	Common Name
Ace pl	75	<i>Acer platanoides</i>	Norway maple
Ail al	4	<i>Ailanthus altissima</i>	Tree of heaven
Cor fl	1	<i>Cornus florida</i>	Flowering dogwood
Fag sy	1	<i>Fagus sylvatica</i>	European beech
Jug ci	3	<i>Juglans cinerea</i>	Butternut
Pru sp	1	<i>Prunus sp.</i>	Cherry species
Rha ca	1	<i>Rhamnus cathartica</i>	Buckthorn
Til sp	1	<i>Tilia sp.</i>	Linden species

Cultural Landscape Report
Green Hill Parcel
Frederick Law Olmsted
National Historic Site
Brookline, Massachusetts
Planting Plan
Canopy & Subcanopy Trees



National Park Service
Olmsted Center for Landscape Preservation
www.nps.gov/oclp

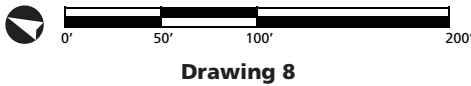
SOURCES
1. Bryant Associates Survey, 1999
2. MEA Partial Topographic Survey, 2006
3. Aerial Photograph, MassGIS, 2009

DRAWN BY
Adrine Arakelian (2011), Shanasia Sylman and Chris Beagan (2015), Melissa Eloshway (2017), OCLP
AutoCAD Map 3D, Photoshop CS5, Illustrator CS5

LEGEND

- Olmsted NHS Boundary
- Olmsted NHS Building
- Other Building
- Proposed Canopy Tree
- Proposed Subcanopy Tree
- Lawn / Groundcover
- Asphalt / Bituminous Concrete Road
- Stonedust Drive / Walk
- Stone Wall
- Ledge

NOTES
1. Contour Interval = 5'-0"
2. All features shown in approximate scale and location.



Planting Plan
Shrubs



National Park Service
Olmsted Center for Landscape Preservation
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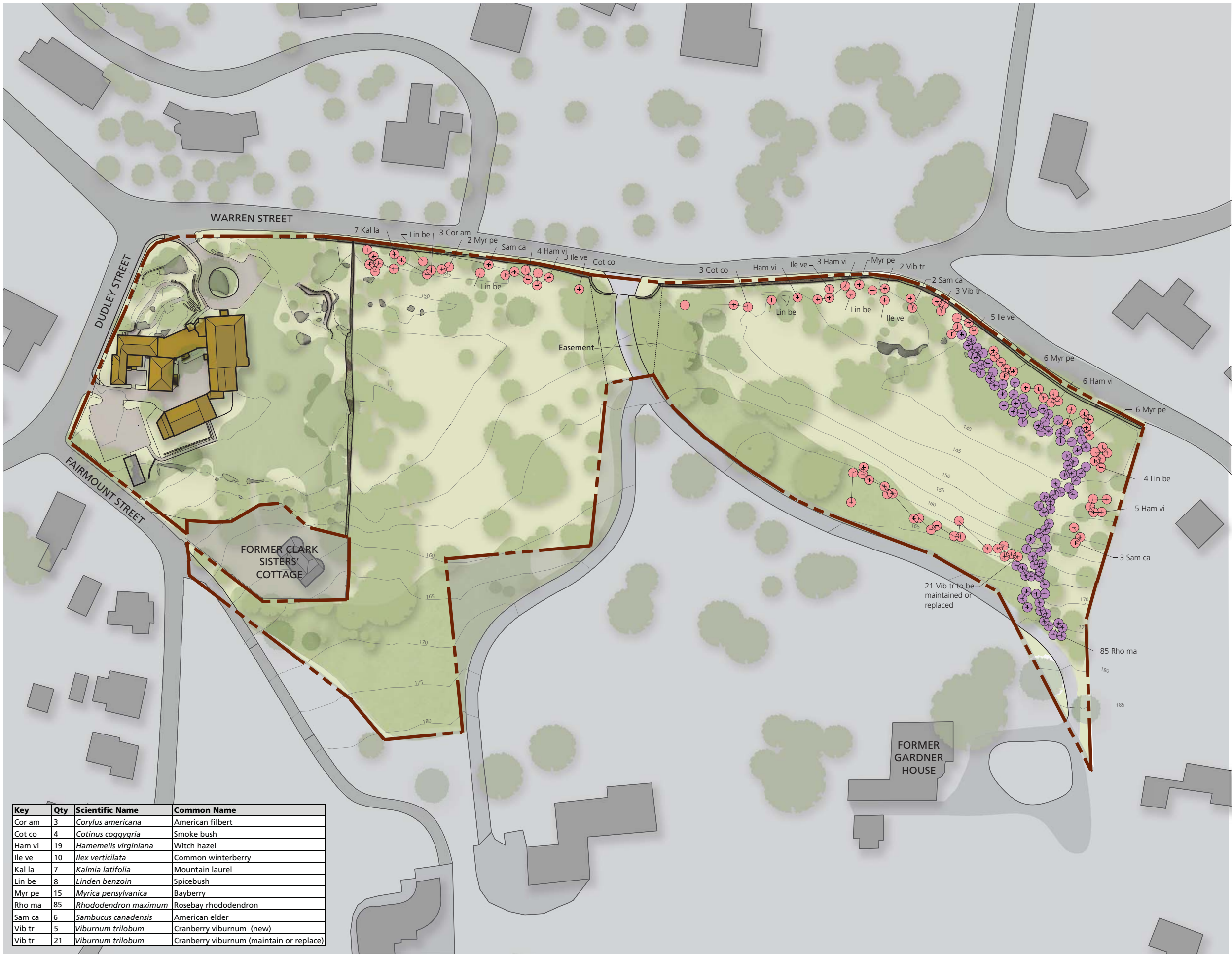
SOURCES
1. Bryant Associates Survey, 1999
2. MEA Partial Topographic Survey, 2006
3. Aerial Photograph, MassGIS, 2009

DRAWN BY
Adrine Arakelian (2011), Shanasia Sylman and Chris Beagan (2015), Melissa Eloshway (2017), OCLP
AutoCAD Map 3D, Photoshop CS5, Illustrator CS5

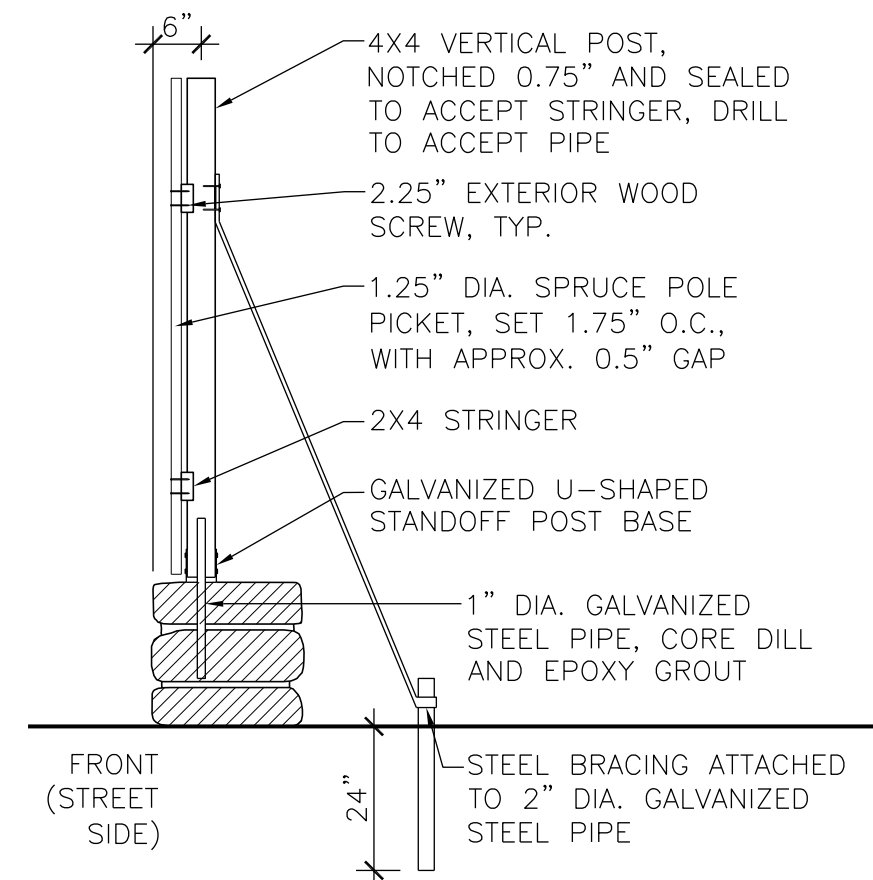
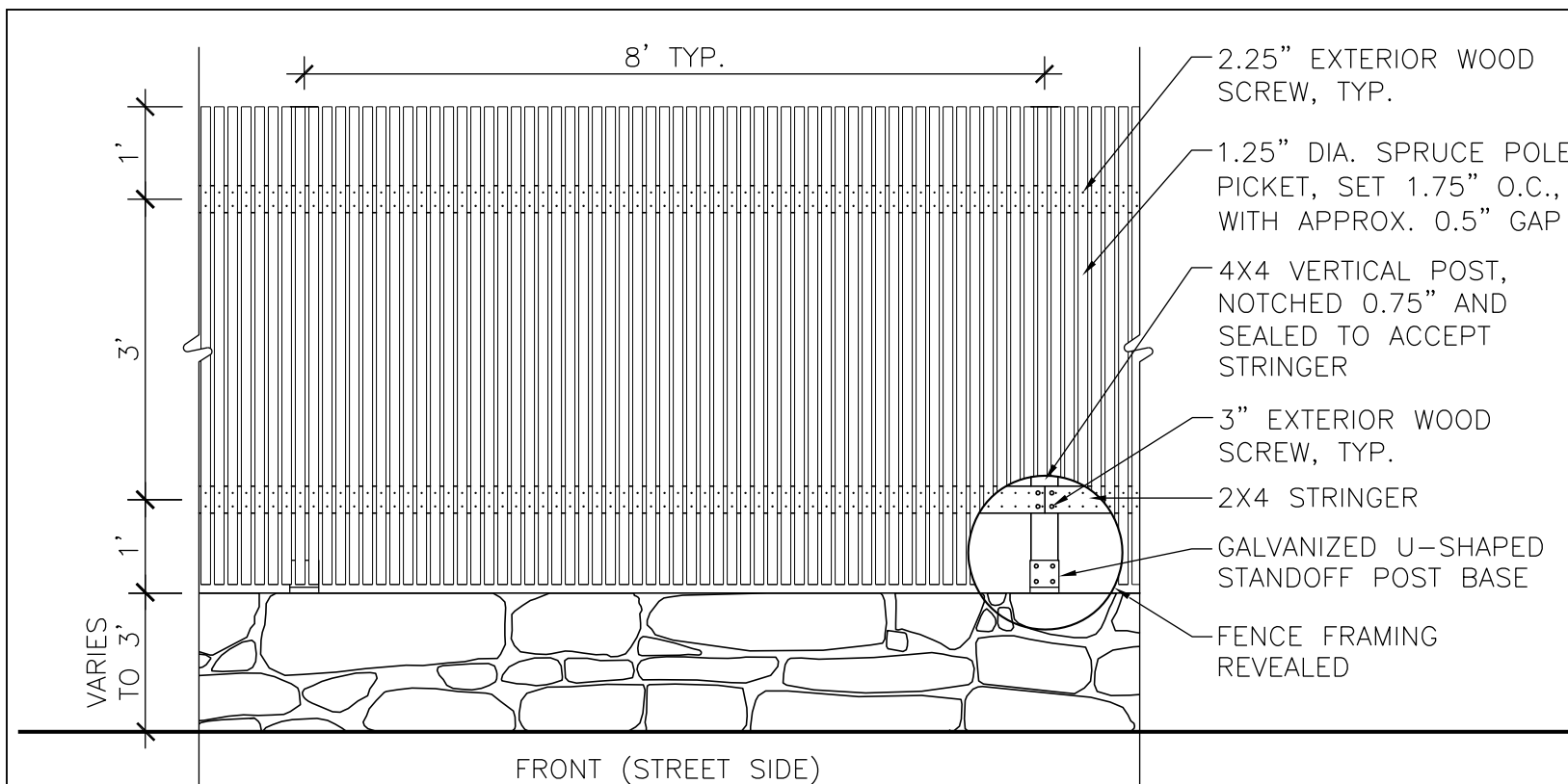
LEGEND

- Olmsted NHS Boundary
- Olmsted NHS Building
- Other Building
- Proposed Woodland Shrub
- Proposed Rhododendron
- Lawn / Groundcover
- Asphalt / Bituminous Concrete Road
- Stonedust Drive / Walk
- Stone Wall
- Ledge

NOTES
1. Contour Interval = 5'-0"
2. All features shown in approximate scale and location.

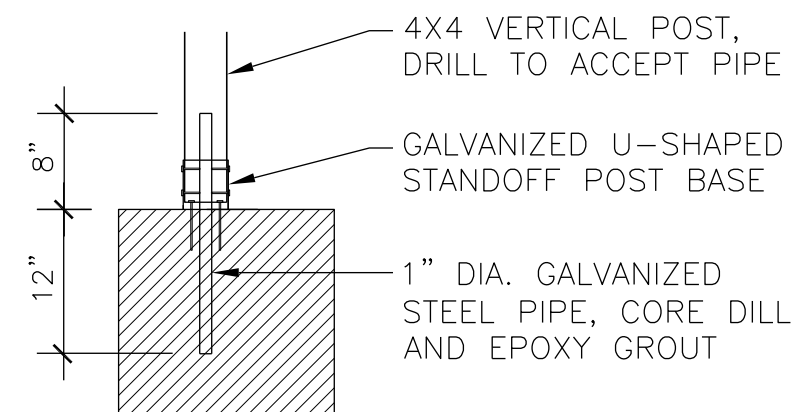
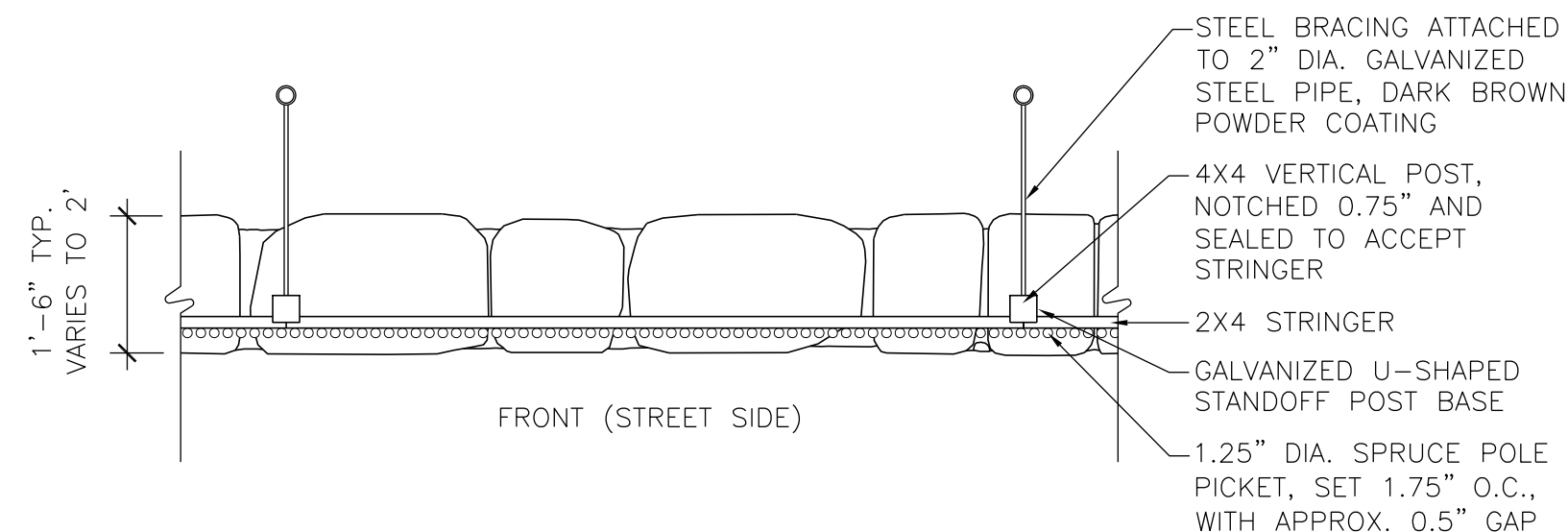


Key	Qty	Scientific Name	Common Name
Cor am	3	<i>Corylus americana</i>	American filbert
Cot co	4	<i>Cotinus coggygia</i>	Smoke bush
Ham vi	19	<i>Hamamelis virginiana</i>	Witch hazel
Ile ve	10	<i>Ilex verticillata</i>	Common winterberry
Kal la	7	<i>Kalmia latifolia</i>	Mountain laurel
Lin be	8	<i>Linden benzoin</i>	Spicebush
Myr pe	15	<i>Myrica pensylvanica</i>	Bayberry
Rho ma	85	<i>Rhododendron maximum</i>	Rosebay rhododendron
Sam ca	6	<i>Sambucus canadensis</i>	American elder
Vib tr	5	<i>Viburnum trilobum</i>	Cranberry viburnum (new)
Vib tr	21	<i>Viburnum trilobum</i>	Cranberry viburnum (maintain or replace)



1 SPRUCE POLE FENCE ELEVATION
SCALE: 1/2"=1'-0"

2 SPRUCE POLE FENCE SECTION
SCALE: 1/2"=1'-0"



3 SPRUCE POLE FENCE PLAN
SCALE: 1/2"=1'-0"

4 POST BASE DETAIL
SCALE: 3/4"=1'-0"

GENERAL NOTES

1. EXTANT STONE WALL VARIES IN HEIGHT BETWEEN 16" AND 36".
2. FENCE SHALL BE 5' IN HEIGHT ABOVE STONE WALL.
3. ALL LUMBER DIMENSIONS ARE NOMINAL.
4. VERTICAL POSTS AND STRINGERS SHALL BE BLACK LOCUST SPECIES, WITHOUT BARK.
5. FENCE PICKETS SHALL BE 1.25" DIA. SPRUCE POLES, WITHOUT BARK, 5' IN HEIGHT.

Cultural Landscape Report Green Hill Parcel

Frederick Law Olmsted
National Historic Site
Brookline, Massachusetts

Schematic Detail Spruce Pole Fence



National Park Service
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www.nps.gov/oclp

DRAWN BY

Angelina R. Jones and Christopher Beagan, OCLP, 2016
AutoCAD Map 3D and Adobe Illustrator

Scale as Noted

Drawing 10

Endnotes

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2. Eric E. Dray, “New Green Hill” from Brookline Planning Department (30 March 1993).
3. Morris Carter, *Isabella Stewart Gardner and Fenway Court* (New York: Houghton Mifflin Company, 1925), 95.
4. Keith N. Morgan, Elizabeth Hope Cushing, and Roger G. Reed, *Community by Design: The Olmsted Firm and the Development of Brookline, Massachusetts* (Amherst, MA: University of Massachusetts Press, 2013).
5. Benjamin Brooks, “A New England Garden Home” *Country Life in America* 1, no 5 (March 1902): 152
6. Casey Riley, “Self Assembled: Isabella Stewart Gardner’s Photographic Albums and the Development of Her Museum, 1902–24” in Elizabeth Edwards and Christopher Morton, eds. *Photographs, Museums, Collections: Between Art and Information* (London: Bloomsbury, 2015).
7. Hildegard Hawthorne, “A Garden of the Imagination,” *The Century Magazine* (July 1910), 447.
8. Frank Augustine Gardner, *Gardner Memorial, A Biographical and Genealogical Record of the Descendants of Thomas Gardner, Planter*, Salem, MA: Higginson Book Company, 1933.
9. Modigliani/Noyes Architects, Boston to Mr. George P. Gardner, Brookline, 30 July 1992, 3 (ISGM).
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11. Eric E. Dray, “New Green Hill” from Brookline Planning Department (30 March 1993).
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16. U.S. Department of the Interior, National Park Service, Cultural Resources, Park Historic Structures & Cultural Landscapes, *Landscape Lines 3: Landscape Characteristics* (Washington, DC: GPO, n.d.), 9.

17. U.S. Department of the Interior, National Park Service, Cultural Resources, Park Historic Structures & Cultural Landscapes, *Landscape Lines 3: Landscape Characteristics* (Washington, DC: GPO, n.d.), 10.
18. The spruce pole fence that borders Fairsted was first installed between 1883 and 1885, most likely circa 1883. It was replaced c. 1904/5 and in 1933.
19. See page 62 of Cynthia Zaitzevsky, *Fairsted, A Cultural Landscape Report for the Frederick Law Olmsted National Historic Site, Volume I: Site History*, Boston, MA: National Park Service and the Arnold Arboretum of Harvard University, 1997.
20. Public Law 96-87, Title II, Sec. 201 A.
21. Public Law 96-87, Title II, Sec. 201 B.
22. Public Law 105-343.
23. Senate Report No. 105-405 (1998).
24. GMP, 7.
25. “Frederick Law Olmsted National Historic Site Preservation Period and Philosophy, May 1987” in Lauren G. Meier, Draft *Cultural Landscape Report for the Frederick Law Olmsted National Historic Site, Volume II: Existing Conditions, Analysis and Treatment*, Brookline, MA: National Park Service Olmsted Center for Landscape Preservation, 1994.
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32. See National Park Service, Fairsted Frederick Law Olmsted National Historic Site: Cultural Landscape Inventory (Boston: OCLP, 2015), p. 75.
33. Brookline Department of Public Works, “Open Space Plan: Section 4 Environmental Inventory and Analysis,” *City of Brookline*, accessed June 28, 2016, <http://www.brooklinema.gov/664/Open-Space-Plan>, p 36.

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APPENDIX A: FREDERICK LAW OLMSTED NATIONAL HISTORIC SITE, GREEN HILL PROPERTY, 2016-2017 EXOTIC PLANT TREATMENT PLAN

Prepared by:

National Park Service, Northeast Region Exotic Plant Management Team
November 2016

Introduction

This plan describes the proposed treatment of invasive exotic plants on the Green Hill Property of Frederick Law Olmsted National Historic Site in the autumn of 2016 through spring of 2017.

The planning for the actions described in this document has been informed by and follow National Park Service Management Policies, Federal and State law and regulation, and integrated pest management (IPM) theory.

IPM theory includes the concept that exotic invasive plants should be controlled by methods that are based on:

- A clear understanding of the biology of the plant
- An evaluation of treatment options that considers the range of treatment options and their efficacy, human health and safety, environmental consequences, available resources, and other relevant factors, and
- If chemical treatment is chosen as a treatment option, choosing from the least-toxic materials that will effectively control the plant

Goals

The primary goals of this plan are to direct actions for:

- Initial control of invasive exotic species within the Green Hill Property
- Replanting or reseeding the portions of the control area with native species.

Successful control of established exotic invasive species typically requires at least five years of effort that includes:

- Initial autumn treatment followed by spot treatment (2-4 weeks after initial treatment) to control regrowth, root-sprouts, and seedlings
- Reseeding or restoring ground cover to heavily impacted areas
- Spring monitoring and spot treatment to control regrowth, root-sprouts and seedlings
- Programmatic monitoring and treatment throughout the growing season until control targets are achieved
- Seasonal monitoring followed by treatment as needed once control targets are achieved

This plan describes the initial efforts required to begin control exotic plants on the Green Hill Property (Autumn, 2016–Spring, 2017). A long-term treatment plan (2016–2022) is in development and will describe the on-going work that will be required to achieve the long-term goal of this effort - converting the vegetation on the property from an exotic invasive plant dominated community to a native plant dominated community.

Treatment Zones

For the purposes of this plan, the Green Hills Property has been divided into 10 treatment zones (see attached map) based on the dominant invasive exotic plants that are present within each treatment zone and the proposed actions for initial control of the invasive exotic plants.

1. Stand of mature Norway Maple adjacent to Fairsted
2. Woodland between Fairsted and the eastern boundary fence
3. English Ivy dominated woodland understory in the northeast corner of the park (Warren Street and the eastern boundary fence)
4. Dense garlic mustard
5. Woodland along the eastern boundary fence
6. Eastern Meadow (slope and flat below the driveway)
7. Western Meadow (Lower and upper) and upper woodland adjacent to Fairsted and the Former Clark Sisters' Cottage

The boundaries of the treatment areas are intended to be descriptive of the dominant exotic species within the area and to guide treatment of those species. There is often significant overlap between adjacent treatment areas.

In addition to the dominant exotic species in each treatment area, other exotic species will be found in each treatment area in lesser numbers and will also be controlled.

The treatment areas are intended as a guide to treatment rather than to rigidly define or limit appropriate treatment of exotic species within a treatment area. As always, the National Park Service will make decisions on treatments based on integrated pest management analysis and will seek to balance available treatment options, treatment impacts and treatment efficacy.

The treatment zones, their existing conditions and the proposed initial control actions for each zone are described below:

Treatment Area 1: Stand of Mature Norway Maple Adjacent to Fairsted

Existing Conditions

Treatment Area 1 is adjacent to the stone wall that forms the western boundary of the Green Hill Property and is characterized by mature native and exotic trees (Norway Maple) that create dense shade over an herbaceous understory dominated by exotic invasive species including gout weed, garlic mustard and dock.

Proposed Initial Treatment

1. Norway Maple
 - a. Remove all Norway Maple except those required to maintain tree canopy or that contribute to the cultural landscape.
 - b. All Norway Maple that are cut should be:
 - i. Cut as close to ground level as is practical
 - ii. Treated with systemic herbicide on the inner bark (cambium layer) to weaken or kill the plant and prevent re-sprouting from stump or roots. Treated stumps should be left intact for no less than 2 weeks following herbicide treatment.
 - iii. After a waiting period of 2 or more weeks following herbicide application, treated cut stumps may be Ground to 4-6 inches below ground surface and covered with soil to create a smooth, even surface if funding and staffing allow.
 - iv. Remove or chip all felled trees and any debris produced during the felling process.
 - c. The site should be monitored in the spring for seedlings, re-sprouting from stumps, and root sprouts.
 - i. Spring seedlings should be pulled or mowed.
 - ii. Sprouts from stumps and roots should be spot treated by foliar spray with systemic herbicide in the spring and again in the early summer if re-sprouting continues.
 - d. The prescription for treatment of Norway Maple by size class is:
 - i. Remove selected mature Norway Maple >24 inches dbh.
 1. Trees cut by a qualified NPS sawyer (chainsaw) or contract sawyer.
 2. Treat cambium layer of cut stumps with systemic herbicide as soon as practical.
 3. Preserve selected large Norway maples to maintain canopy and landscape character until native trees mature to take their place in the landscape.
 - ii. Remove all Norway Maples <24 inches dbh - 6 inches dbh.
 1. Trees cut buy qualified NPS sawyer, hand saw or contract sawyer.
 - a. Contract sawyer to remove larger and more technically challenging smaller trees

- b. Qualified NPS sawyer or hand saws for smaller or less technically challenging trees.
 - 2. Treat cambium layer of cut stumps with systemic herbicide as soon as practical.
- iii. Remove all Norway Maples < 6 inches dbh.
 - 1. Larger trees cut by qualified NPS sawyer or hand tools.
 - 2. Treat cambium layer of cut stumps with systemic herbicide as soon as possible.
 - 3. Pull seedlings by hand
 - 4. Pull saplings by hand or with weed wrench (smooth or fill stump holes as needed to create an even surface).
 - 5. Cut

2. Goutweed

Goutweed is a hearty perennial that is effectively controlled by a combination of foliar application of systemic herbicide in the autumn and spring and mowing/string trimming in the summer (prevents seed formation and causes plants to exhaust resources stored in the roots).

- a. Continue the program of treating goutweed by foliar spray of systemic herbicide in the autumn and early spring.
 - i. Apply a systemic herbicide by foliar spray in the late autumn at the onset of cold weather.
 - ii. Re-apply on any new or resistant growth 2-3 weeks after the first application.
 - iii. Spot treat new spring growth in April with a foliar spray of systemic herbicide.
 - iv. Re-apply herbicide on new growth every 2-4 weeks through June.
 - v. Mow or string trim every 2-4 weeks through the summer to prevent seed formation and to reduce nutrient storage in the roots.
- b. Mow or string trim every 2-4 weeks through the summer to prevent seed formation and to reduce nutrient storage in the roots.

3. Garlic Mustard

Garlic mustard is a highly invasive biennial that can be effectively controlled by regular hand pulling to remove plants and prevent seed production. Because garlic mustard can re-sprout from root fragments and germinate from seeds released over five years earlier regular monitoring and hand pulling throughout the growing season is critically important to successful control. If plants with seed heads are found, bag the seed heads and dispose of them. Do not compost seed heads.

- i. Monitor the area for garlic mustard starting in early April. Flower heads are distinctive and highly visible.
 - 1. Hand pull all garlic mustard forming flower heads to remove plants, roots and prevent seed production.
 - 2. If there are dense clumps of garlic mustard seedlings (first year plants), treat with a foliar spray of systemic herbicide.

3. Widely scattered individual plants may be spot-treated with a foliar spray of systemic herbicide.
4. Monitor every two weeks and pull garlic mustard plants detected until mid-June.
- ii. Continue to monitor the area every 2 weeks until no garlic mustard is detected for 2 monitoring cycles (4 weeks).
- iii. Then monitor every 3-4 weeks, removing plants as they are detected until the first frost.
- iv. Treat high density populations of first year (non-blooming) plants by foliar application of systemic herbicide in the early spring.

4. Dock

Dock is a hearty biennial that forms a large rosette of leaves and deep tap root in its first year and a large rosette of leaves and a substantial branching stalk of flower heads in its second year. After producing seeds, the second year plants die.

- a. First year plants are effectively controlled by foliar application of systemic herbicide in the autumn after the onset of cool weather and in the early spring.
- b. Second year plants are more difficult to control effectively. Best management practices include pulling plants in the summer and autumn (after flower stalks form) by hand or with a weed wrench, regularly removing flower stalks in the bud stage and regular mowing.
- c. Re-sprouting from root fragments left after pulling is common. New growth should be treated by foliar application of systemic herbicide within 2-4 weeks.
 - i. In the autumn, treat first year plants (all plants without flower stalks) by foliar application of systemic herbicide and pull all second-year plants (plants with flower heads/seed heads). Bag all flower and seed heads for disposal (do not compost).
 - ii. In the spring, treat first year and second year plants with systemic herbicide in April by foliar application of a systemic herbicide. Repeat every 3-4 weeks through the spring to control seedlings and re-sprouting of older plants.
 - iii. In the summer, hand pull or weed wrench plants that develop flower stalks/flower heads removing as much of the root as possible or cut back/mow the plants (first and second year plants) every 2-3 weeks. Bag and dispose of any flower heads/seed heads. Compost plants without flower heads.
 - iv. In the fall, after the onset of cold weather, treat first year plants with foliar application of systemic herbicide. Pull or cut all second-year plants (bag all flower/seed heads).

Treatment Area 2: Woodland between Fairsted and the Driveway Adjacent to Warren Street***Existing Conditions***

Treatment Area 2 includes the woodland that runs from the stone wall separating the Fairsted Property from the Green Hill Property to the driveway exiting onto Warren Street. The western side of the treatment area runs on top of and beside a long ridge of bedrock that outcrops in a few areas but is covered by soils and vegetation over most of its length. The eastern side of the treatment area is relatively flatter and lower. The high canopy of this woodland is dominated by mature native species (oaks, maples, pines and cherry) with occasional Norway Maple and Ailanthus (exotics). The lower canopy trees include smaller diameter native (maple, oak, walnut, etc.) and an interesting mix of exotic trees (Ailanthus, Kentucky coffee tree, devil's walking stick, Siberian elm, etc.). Shrubs (buckthorn, Euonymus, stag horn sumac, privet, etc.), isolated stands of Japanese knotweed and vines (bittersweet, multiflora rose, black swallowwort and raspberry) form a moderately dense understory in some areas and are largely absent in others. The herb layer includes some substantial areas dominated by native species (asters, ferns, etc.) and other areas dominated by exotics (goutweed, dock, etc.).

Park staff have recently removed large numbers of exotic saplings and trees from this area using hand tools. They should be commended for the level of effort expended and the efficacy of their work. To support this effort, high priority should be placed on monitoring this area for re-sprouting from stumps in the spring and ensuring timely foliar herbicide treatment of the re-growth.

Proposed Treatment

All trees in this treatment area except Ailanthus respond well to the same prescription:

- Treat freshly cut stumps with systemic herbicide
- Treat re-sprouting stumps with foliar application of systemic herbicide
- Treat stumps and un-cut trees with basal bark application of 25% Garlon 4 in oil in the late winter/early spring (approximately 6 weeks before leaf-out).

To prevent Ailanthus trees from producing abundant root sprouts, Ailanthus must be killed before the main trunk or large branches are cut. Use basal bark (fall or late winter), "Hack and Squirt" or Drill and Fill" herbicide application are the preferred methods for Ailanthus as these methods require a relatively small amount of herbicide, place the herbicide only on the target plant (not on other plants or on the soil), and are quite effective.

1. Exotic Trees except Ailanthus will be treated under the following prescription:
 - a. If not immediately treating with Herbicide:
 - i. Cut tree in the autumn and remove cut material.
 - ii. Then either:
 1. Use basal bark treatment with 25% Garlon 4 in oil in the fall or late winter (approximately 6 weeks before leaf-out).

2. Allow the stump to re-sprout in the spring until there is sufficient leaf area to effectively absorb a foliar application of systemic herbicide and treat with a foliar application of systemic herbicide (re-treating with herbicide as needed every tree is killed).
 - iii. If immediately treating with herbicide:
 1. Cut stumps as close to ground level as is practical.
 2. Immediately treat with systemic herbicide on the inner bark (cambium layer) to weaken or kill the plant and prevent re-sprouting from stump or roots. Treated stumps should be left intact for no less than 2 weeks following herbicide treatment.
 3. After a waiting period of at least 2 weeks following herbicide application, treated cut stumps can be Ground to 4-6 inches below ground surface and covered with soil to create a smooth, even surface if funding and staffing allow.
 4. Remove or chip all felled trees and any debris produced during the felling process.
 5. Monitor in the spring for seedlings, re-sprouting from stumps, and root sprouts.
 6. Spring seedlings should be pulled or mowed.
 7. Sprouts from stumps and roots should be spot treated by foliar spray with systemic herbicide in the spring and again in the early summer if re-sprouting continues.
 8. Large trees (e.g. mature Norway Maples) will need to be felled by qualified NPS sawyer or contract sawyer.
2. Ailanthus
 - a. In the autumn, treat Ailanthus with systemic herbicide using basal bark, “hack and squirt” or “drill and fill” herbicide application:
 - i. Basal Bark – spray or brush 25% solution of Garlon 4 in oil onto the bark at the base of the tree.
 - ii. Hack and Squirt – Make shallow cuts in the bark at 1-2 inch intervals around the trunk of the tree to expose the cambium layer. Immediately after making the cut, squirt concentrated systemic herbicide into the cut.
 - iii. Drill and Fill – Drill ½-inch diameter holes at an angle down into the trunk of the tree spaced 1-2 inches apart around the tree. Immediately after drilling each hole, fill the hole with concentrated systemic herbicide.
 - b. Let the tree overwinter without further treatment.
 - c. Monitor the tree in the spring to determine if the herbicide has killed the tree.
 - i. If the tree is dead, remove the tree.
 - ii. If the tree is alive, re-treat the tree with herbicide in the early spring (either repeat the fall treatment or use foliar spray).
3. Shrubs
 - a. In the autumn:

- i. When possible, pull shrubs with a weed wrench, removing as much root mass as possible.
 - ii. When pulling is not a viable option, treat shrubs with systemic herbicide by either:
 - 1. Cut stump application (water or oil based herbicide)
 - 2. Basal bark application (oil based herbicide)
 - 3. For shrubs, cut stump and basal bark treatments are generally preferred over foliar spray to limit impacts to surrounding vegetation.
- b. In the spring:
 - i. Monitor area for seedlings, regrowth from root fragments and re-sprouting stumps.
 - ii. Pull or mow seedlings.
 - iii. Pull or apply systemic herbicide by foliar spray on new growth from root fragments when sufficient foliage emerges to allow effective absorption.
 - iv. Apply systemic herbicide by foliar spray to re-sprouting stumps when sufficient foliage emerges to allow effective absorption.
 - v. Continue to monitor monthly and treat as needed.

4. Woody Vines

Woody vines present in this treatment area include oriental bittersweet, porcelain berry, multiflora rose and Raspberry. All of these vines can be treated effectively by cut stump, basal bark or foliar application of systemic herbicide. Except where the vines and other exotic species have effectively excluded most native species, cut stump and basal bark treatment is preferred.

- a. In the autumn:
 - i. When possible, pull woody vines with a weed wrench, removing as much root mass as possible.
 - ii. When pulling is not a viable option, treat the vines with systemic herbicide (by either:
 - 1. Cut stump application (water or oil based herbicide)
 - 2. Basal bark application (oil based herbicide)
 - 3. For woody vines, cut stump and basal bark treatments are generally preferred over foliar spray to limit impacts to surrounding vegetation.
- b. In the spring:
 - i. Monitor area for woody vine seedlings, regrowth from root fragments and re-sprouting stumps.
 - ii. Pull or mow seedlings.
 - iii. Pull or apply systemic herbicide by foliar spray on new growth from root fragments when sufficient foliage emerges to allow effective absorption.
 - iv. Apply systemic herbicide by foliar spray to re-sprouting stumps when sufficient foliage emerges to allow effective absorption.

- v. Continue to monitor monthly and treat as needed (mow, pull, cut or retreat with herbicide).

5. Herb Layer

a. Goutweed

Goutweed is a hearty perennial that is effectively controlled by a combination of foliar application of systemic herbicide in the autumn and spring and mowing/string trimming in the summer (prevents seed formation and causes plants to exhaust resources stored in the roots).

- i. Continue the program of treating goutweed by foliar spray of systemic herbicide in the autumn and early spring.
 - 1. Apply a systemic herbicide by foliar spray in the late autumn at the onset of cold weather.
 - 2. Re-apply on any new or resistant growth 2-3 weeks after the first application.
 - 3. Spot treat new spring growth in April with a foliar spray of systemic herbicide.
 - 4. Re-apply herbicide on new growth every 3-4 weeks through June.
 - 5. Mow or string trim every 2-4 weeks through the summer to prevent seed formation and to reduce nutrient storage in the roots.

b. Garlic Mustard

Park staff have initiated garlic mustard control and have greatly reduced the population of garlic mustard on much of the property. Garlic mustard is still present in small amounts though most of this treatment area. There is a large (approximately 0.3 acres), very dense population of garlic mustard starting near the intersection of Warren and Sargent Streets and continuing almost to the eastern boundary fence. Controlling garlic mustard in this area is a very high priority for the spring and may take significant effort. Garlic mustard is a highly invasive biennial that can be effectively controlled by regular hand pulling to remove plants and prevent seed production. Because garlic mustard can re-sprout from root fragments and germinate from seeds released over five years earlier regular monitoring and hand pulling throughout the growing season is critically important to successful control. If plants with seed heads are found, bag the seed heads and dispose of them. Do not compost seed heads.

- i. Monitor the entire area for garlic mustard starting in early April. Flower heads are distinctive and highly visible.
- ii. Hand pull all garlic mustard forming flower heads to remove plants, roots and prevent seed production.
- iii. It is likely that there will be dense stands of garlic mustard seedlings (first year plants) at the eastern end of the treatment area. Hand pulling these plants will

be largely ineffective and time prohibitive. Spot treat with a foliar spray of systemic herbicide.

- iv. Widely scattered individual first year plants may be spot-treated with a foliar spray of systemic herbicide, hand pulled or dug out of the soil.
- v. Monitor every two weeks and pull garlic mustard plants detected until mid-June.
- vi. Continue to monitor the area every 2 weeks until no garlic mustard is detected for 2 monitoring cycles (4 weeks). This level of control may not be achieved in this area this year.
- vii. Then monitor every 3-4 weeks, removing plants as they are detected until the first frost.

c. Dock

Dock is a hearty biennial that forms a large rosette of leaves and deep tap root in its first year and a large rosette of leaves and a substantial branching stalk of flower heads in its second year. After producing seeds, the second year plants die.

- i. First year plants are effectively controlled with systemic herbicide in the autumn after the onset of cool weather and in the early spring.
- ii. Re-sprouting from root fragments left after pulling is common. New growth should be treated by foliar application of systemic herbicide within 2-4 weeks.
 - 1. In the autumn, treat first year plants (all plants without flower stalks) by foliar application of systemic herbicide and pull all second-year plants (plants with flower heads/seed heads). Bag all flower and seed heads for disposal (do not compost).
 - 2. In the spring, treat first year and second year plants with systemic herbicide in April by foliar application of a systemic herbicide. Repeat every 3-4 weeks through the spring to control seedlings and re-sprouting of older plants.
 - 3. In the summer, hand pull or weed wrench plants that develop flower stalks/flower heads removing as much of the root as possible or cut back/mow the plants (first and second year plants) every 2-3 weeks. Bag and dispose of any flower heads/seed heads. Compost plants without flower heads.
 - 4. In the fall, after the onset of cold weather, treat first year plants with foliar application of systemic herbicide. Pull or cut all second-year plants (bag all flower/seed heads).

d. Other Species

- i. Other exotic species including Japanese knotweed, black swallowwort, Mullien, stinging nettle and porcelain berry are present in low numbers in this treatment area. Prompt and effective control of these species should be a high priority to prevent their spread within this treatment area.

Treatment Area 3: English Ivy Dominated Woodland Understory in the Northeast Corner of the Park (Warren Street and the Eastern Boundary Fence)***Existing Conditions***

This area is a subset of Treatment Area 2 where the dominant plant in the understory is English Ivy. English Ivy is not highly invasive in New England and is considered to be a component of the cultural landscape. Control efforts and treatment of the ivy will be limited to restricting the English Ivy to its current area or a somewhat smaller area. There is currently no intent to eradicate English Ivy from the property.

Proposed Treatment

- Effective control can be achieved by hand pulling the vines to uproot them. Pull the vines back to the desired population limit and then cut with hand pruners or loppers.
- Mowing or string trimming, while less effective, can also be used to limit population growth.

Treatment Area 4: Woodland along the Eastern Boundary Fence***Existing Conditions***

Other than a number of large Norway Maples that form a significant portion of the high canopy, exotic vines (English ivy, porcelain berry, oriental bittersweet, black swallowwort) invading along its northern and western edge and some garlic mustard at its northern and southern margins, this treatment area has relatively low populations of exotic species.

Several individual dock plants, Canada thistle and small multiflora rose were located in the treatment area this summer and were hand cut. A Wisteria vine was also noted and should be treated.

Proposed Treatment

- The large Norway Maples in this area will be selectively removed over time to preserve the high canopy layer and allow smaller native trees currently in the understory to mature. Smaller Norway maple trees (Cut stump herbicide application) and seedlings (hand pull string trim or mow) will be removed.
- Treat the Wisteria with a basal bark application of oil-based systemic herbicide.
- Survey the area in the spring and use manual and/or chemical controls to treat dock, thistle, and multiflora rose in the understory.
- Monitor and hand pull garlic mustard as described for treatment area 2.
- Control invading porcelain berry, bittersweet, Canada thistle and black swallow wort as described in treatment area 5.

Treatment Area 5: Eastern Meadow (Slope and Flat below the Driveway)***Existing Conditions***

This treatment area consists of a sloping open meadow with a few scattered trees bordered at the top by a strip of mown lawn and recently planted shrubs and at the bottom by a mixed woodland (Treatment area 2). Much of this treatment area is covered with high density populations of three highly invasive vines (porcelain berry, black swallowwort and oriental bittersweet) and Canada thistle. Ailanthus, buckthorn, goutweed, garlic mustard and a small cluster of Japanese knotweed are present in the flat area below the slope.

Proposed Treatment

1. Strip of mown lawn
 - a. Spot treat Canada thistle with systemic herbicide in the fall and spring.
2. Slope
 - a. In the autumn, apply systemic herbicide by foliar spray to areas of the slope where the dominant vegetation consists of black swallowwort, porcelain berry, Canada thistle and/or bittersweet.
 - b. If there is significant re-growth in the autumn, follow up with spot treatment 1-3 weeks after initial treatment.
 - c. Apply 25% solution of Garlon 4 in oil by basal bark treatment in late winter/early spring.
 - d. In the spring, spot treat any regrowth as needed, repeating at 3-4 week intervals in the spring until control targets are achieved or until late June/early July.
 - e. During the summer, mow at regular intervals (1-3 weeks) to draw resources from the roots and weaken the plants.
 - f. Apply systemic herbicide in the fall after the onset of cold weather if needed.
 - g. Replant by broadcast seeding or disk seeding with a native meadow seed mix.
3. Flat
 - a. Treat areas of black swallowwort, porcelain berry, Canada thistle and/or bittersweet as described above.
 - b. Japanese knotweed plants were uprooted in the late summer. Monitor in the spring for regrowth and dig roots or apply foliar herbicide in the spring.
 - c. Treat Ailanthus by “hack and squirt” application of systemic herbicide in the autumn. Monitor in the spring for re-growth. In the spring, re-treat the Ailanthus (if still alive in the spring) or remove the dead tree.

Treatment Area 6: Western Meadow (Lower and Upper)

Existing Conditions

Treatment Area 6 includes the meadow, landscaped areas and shrub/woodland margin to the west of the driveways exiting onto Warren Street and effectively splitting the property. The lower meadow is densely covered with burdock with lower densities of goutweed, butter and eggs (*Lineria*), garlic mustard and other invasives and native plants.

The upper meadow is dominated by tall grasses and blackberry with an understory of creeping buttercup, ground ivy, and goutweed. Smaller patches of multiflora rose, burdock, various mustards, Canada thistle and oriental bittersweet are spread throughout the meadow.

Several large ornamental trees and shrubs are scattered through the site. Smaller native and invasive trees are also present. A number of small-mid-size invasive shrubs, saplings and trees were removed from this area using hand tools.

Proposed Treatment

All trees in this treatment area except *Ailanthus* respond well to the same prescription:

- Treat freshly cut stumps with systemic herbicide
- Treat re-sprouting stumps with foliar application of systemic herbicide
- Treat stumps and un-cut trees with basal bark application of 25% Garlon 4 in oil in the late winter/early spring (approximately 6 weeks before leaf-out).

To prevent *Ailanthus* trees from producing abundant root sprouts, *Ailanthus* must be killed before the main trunk or large branches are cut. Use basal bark (fall or late winter), “Hack and Squirt” or Drill and Fill” herbicide application are the preferred methods for *Ailanthus* as these methods require a relatively small amount of herbicide, place the herbicide only on the target plant (not on other plants or on the soil), and are quite effective.

1. Exotic Trees except *Ailanthus* will be treated under the following prescription:
 - a. If not immediately treating with Herbicide:
 - i. Cut tree in the autumn and remove cut material.
 - ii. Then either:
 1. Use basal bark treatment with 25% Garlon 4 in oil in the fall or late winter (approximately 6 weeks before leaf-out).
 2. Allow the stump to re-sprout in the spring until there is sufficient leaf area to effectively absorb a foliar application of systemic herbicide and treat with a foliar application of systemic herbicide (re-treating with herbicide as needed every tree is killed).
 - iii. If immediately treating with herbicide:
 1. Cut stumps as close to ground level as is practical.

2. Immediately treat with systemic herbicide on the inner bark (cambium layer) to weaken or kill the plant and prevent re-sprouting from stump or roots. Treated stumps should be left intact for no less than 2 weeks following herbicide treatment.
3. After a waiting period of at least 2 weeks following herbicide application, treated cut stumps can be Ground to 4-6 inches below ground surface and covered with soil to create a smooth, even surface if funding and staffing allow.
4. Remove or chip all felled trees and any debris produced during the felling process.
5. Monitor in the spring for seedlings, re-sprouting from stumps, and root sprouts.
6. Spring seedlings should be pulled or mowed.
7. Sprouts from stumps and roots should be spot treated by foliar spray with systemic herbicide in the spring and again in the early summer if re-sprouting continues.
8. Large trees (e.g. mature Norway Maples) will need to be felled by qualified NPS sawyer or contract sawyer.

2. Ailanthus

- a. In the autumn, treat Ailanthus with systemic herbicide using basal bark, “hack and squirt” or “drill and fill” herbicide application:
 - i. Basal Bark – spray or brush 25% solution of Garlon 4 in oil onto the bark at the base of the tree.
 - ii. Hack and Squirt – Make shallow cuts in the bark at 1-2 inch intervals around the trunk of the tree to expose the cambium layer. Immediately after making the cut, squirt concentrated systemic herbicide into the cut.
 - iii. Drill and Fill – Drill ½-inch diameter holes at an angle down into the trunk of the tree spaced 1-2 inches apart around the tree. Immediately after drilling each hole, fill the hole with concentrated systemic herbicide.
- b. Let the tree overwinter without further treatment.
- c. Monitor the tree in the spring to determine if the herbicide has killed the tree.
 - i. If the tree is dead, remove the tree.
 - ii. If the tree is alive, re-treat the tree with herbicide in the early spring (either repeat the fall treatment or use foliar spray).

3. Shrubs

- a. In the autumn:
 - i. When possible, pull shrubs with a weed wrench, removing as much root mass as possible.
 - ii. When pulling is not a viable option, treat shrubs with systemic herbicide by either:
 1. Cut stump application (water or oil based herbicide)
 2. Basal bark application (oil based herbicide)

3. For shrubs, cut stump and basal bark treatments are generally preferred over foliar spray to limit impacts to surrounding vegetation.

b. In the spring:

- i. Monitor area for seedlings, regrowth from root fragments and re-sprouting stumps.
- ii. Pull or mow seedlings.
- iii. Pull or apply systemic herbicide by foliar spray on new growth from root fragments when sufficient foliage emerges to allow effective absorption.
- iv. Apply systemic herbicide by foliar spray to re-sprouting stumps when sufficient foliage emerges to allow effective absorption.
- v. Continue to monitor monthly and treat as needed.

4. Woody Vines

Woody vines present in this treatment area include oriental bittersweet, porcelain berry, multiflora rose and Raspberry. All of these vines can be treated effectively by cut stump, basal bark or foliar application of systemic herbicide. Except where the vines and other exotic species have effectively excluded most native species, cut stump and basal bark treatment is preferred.

a. In the autumn:

- i. When possible, pull woody vines with a weed wrench, removing as much root mass as possible.
- ii. When pulling is not a viable option, treat the vines with systemic herbicide (by either:
 1. Cut stump application (water or oil based herbicide)
 2. Basal bark application (oil based herbicide)
 3. For woody vines, cut stump and basal bark treatments are generally preferred over foliar spray to limit impacts to surrounding vegetation.

b. In the spring:

- i. Monitor area for woody vine seedlings, regrowth from root fragments and re-sprouting stumps.
- ii. Pull or mow seedlings.
- iii. Pull or apply systemic herbicide by foliar spray on new growth from root fragments when sufficient foliage emerges to allow effective absorption.
- iv. Apply systemic herbicide by foliar spray to re-sprouting stumps when sufficient foliage emerges to allow effective absorption.
- v. Continue to monitor monthly and treat as needed (mow, pull, cut or retreat with herbicide).

5. Herb Layer

a. Goutweed

Goutweed is a hearty perennial that is effectively controlled by a combination of foliar application of systemic herbicide in the autumn and spring and mowing/string trimming in the summer (prevents seed formation and causes plants to exhaust resources stored in the

roots). Continue the program of treating goutweed by foliar spray of systemic herbicide in the autumn and early spring.

- i. Apply a systemic herbicide by foliar spray in the late autumn at the onset of cold weather.
- ii. Re-apply on any new or resistant growth 2-3 weeks after the first application.
- iii. Spot treat new spring growth in April with a foliar spray of systemic herbicide.
- iv. Re-apply herbicide on new growth every 3-4 weeks through June.
- v. Mow or string trim every 2-4 weeks through the summer to prevent seed formation and to reduce nutrient storage in the roots.

b. Creeping Buttercup and Ground Ivy

These species dominate the understory beneath the tall grasses in upper meadow.

Maintaining or replanting the tall grasses and introducing additional native meadow species should effectively reduce the populations of these plants.

c. Garlic Mustard

Park staff have initiated garlic mustard control and have greatly reduced the population of garlic mustard on much of the property. Garlic mustard is still present in small amounts though most of this treatment area.

- i. Monitor the entire area for garlic mustard starting in early April. Flower heads are distinctive and highly visible.
- ii. Hand pull all garlic mustard forming flower heads to remove plants, roots and prevent seed production.
- iii. Monitor every two weeks and pull garlic mustard plants detected until mid-June.

d. Dock

Dock is a hearty biennial that forms a large rosette of leaves and deep tap root in its first year and a large rosette of leaves and a substantial branching stalk of flower heads in its second year. After producing seeds, the second year plants die.

- i. First year plants are effectively controlled by foliar application of systemic herbicide in the autumn after the onset of cool weather and in the early spring.
- ii. Second year plants are more difficult to control effectively. Best management practices include pulling plants in the summer and autumn (after flower stalks form) by hand or with a weed wrench, regularly removing flower stalks in the bud stage and regular mowing.
- iii. Re-sprouting from root fragments left after pulling is common. New growth should be treated by foliar application of systemic herbicide within 2-4 weeks.
 1. In the autumn, treat first year plants (all plants without flower stalks) by foliar application of systemic herbicide and pull all second-year plants (plants with flower heads/seed heads). Bag all flower and seed heads for disposal (do not compost).

2. In the spring, treat first year and second year plants with systemic herbicide in April by foliar application of a systemic herbicide. Repeat every 3-4 weeks through the spring to control seedlings and re-sprouting of older plants.
3. In the summer, hand pull or weed wrench plants that develop flower stalks/flower heads removing as much of the root as possible or cut back/mow the plants (first and second year plants) every 2-3 weeks. Bag and dispose of any flower heads/seed heads. Compost plants without flower heads.
4. In the fall, after the onset of cold weather, treat first year plants with foliar application of systemic herbicide. Pull or cut all second-year plants (bag all flower/seed heads).

e. Other Species

Other exotic species including Japanese knotweed, black swallowwort, Mullien, stinging nettle and porcelain berry are present in low numbers in this treatment area. Prompt and effective control of these species should be a high priority to prevent their spread within this treatment area.

Treatment Area 7: Woodland above Treatment Area 1 and 6 Adjacent to Fairsted and the Former Clark Sisters' Cottage***Existing Conditions***

The shrubby border and woodland adjacent to the western upper meadow is densely populated with buckthorn, oriental bittersweet and multiflora rose along the ecotone between the meadow and woodland. Within the woodland the shrub layer is dominated by buckthorn with a highly mixed herb layer of native and invasive species. The woodland canopy is largely composed of Norway maple with scattered natives.

Proposed Treatment

- Selectively remove Norway Maple trees and other invasive trees while maintaining canopy and visual screen to maintain the cultural landscape. Use cut stump herbicide treatment to prevent stumps from re-sprouting.
- In the shrubby border, use cut stump and basal bark application or herbicide as described earlier in this plan to control invasives
- Hand pull or spot treat herb layer species with herbicide as described earlier in this plan.

APPENDIX B: FREDERICK LAW OLMSTED NATIONAL HISTORIC SITE, GREEN HILL PROPERTY, DRY MEADOW PLANTING PALETTE

Prepared by:

National Park Service, Northeast Region Exotic Plant Management Team
September 2016

Scientific Name	Common Name
<i>Agrostis perennans</i>	autumn bentgrass
<i>Andropogon glomeratus</i>	bushy bluestem
<i>Asclepias syriaca</i>	common milkweed
<i>Aster novae angliae</i>	New England aster
<i>Baptisia australis</i>	blue wild indigo
<i>Carex appalachica</i>	Appalachian sedge
<i>Carex crinita</i>	fringed sedge
<i>Carex eburnea</i>	bristle-leaved tickseed
<i>Comptonia peregrina</i>	sweet fern
<i>Coreopsis verticillata</i>	thread-leaved tickseed
<i>Echinacea purpurea</i>	eastern purple
<i>Eragrostis spectabilis</i>	purple lovegrass
<i>Eryngium yuccifolium</i>	rattlesnake-master
<i>Eupatorium hyssopifolium</i>	hyssop-leaved boneset
<i>Eupatorium perfoliatum</i>	boneset thoroughwort
<i>Eurybia divaricata</i>	white wood aster
<i>Eutrochium maculatum/ Eupatorium maculatum</i>	spotted Joe-Pye weed
<i>Helianthus divaricatus</i>	woodland sunflower
<i>Heliopsis helianthoides</i>	sunflower everlasting
<i>Ionactis linariifolius</i>	stiff aster
<i>Liatris novae-angliae</i>	northern blazing star
<i>Monarda fistulosa</i>	wild bee-balm
<i>Monarda virgatum</i>	spotted bee-balm
<i>Panicum virgatum</i>	switch grass
<i>Penstemon digitalis</i>	foxglove beardtongue
<i>Pycnanthemum tenuifolium</i>	narrow leaf mountain mint
<i>Rudbeckia fulgida</i>	showy coneflower
<i>Rudbeckia triloba</i>	brown eyed Susan

<i>Schizachyrium scoparium</i>	little bluestem
<i>Senna hebecarpa</i>	wild senna
<i>Solidago caesia</i>	blue-stem goldenrod
<i>Solidago nemoralis</i>	gray goldenrod
<i>Solidago odora</i>	licorice goldenrod
<i>Sorghastrum nutans</i>	Indian grass
<i>Stylophorum diphyllum</i>	greater celandine
<i>Symphotrichum laeve</i>	smooth American-aster
<i>Symphotrichum novae-angliae</i>	New England American-aster
<i>Symphotrichum novi-belgii</i>	New York American-aster
<i>Veronicastrum virginicum</i>	Culver's root

OLMSTED CENTER FOR LANDSCAPE PRESERVATION

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