

Cultural Landscape Preservation in Context: Responding to a Changing Environment

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Introduction

AMERICAN HISTORY IS WELL REPRESENTED IN THE NATIONAL PARK SYSTEM. The cultural landscapes associated with this heritage offer a powerful format to tell the story of our nation, whether they be associated with important events, activities, and persons; reveal specific trends in landscape architecture or gardening; reflect vernacular patterns of early settlement and land use; or retain important ties to contemporary people. To ensure that these landscapes are preserved, we need to understand how to address landscape systems, and the dynamic qualities inherent in landscapes, within the construct of historic preservation practice.

There is a common perception that the primary goal of cultural resource management is to “freeze” a place in time. It is true that the basic tenants of historic preservation focus on retaining surviving resources and a high degree of authenticity. Replicating historic conditions is always the first consideration in stewardship because it minimizes change and provides the most authentic representation. However, the reality of cultural resource management is far more complex, and there are a variety of factors that will result in some level of change to a historic property. For that reason, in preservation practice “rehabilitation” is the most commonly used of the four approaches to the treatment of historic properties. This approach clearly recognizes the need to accommodate change, and changes are considered in the context of the cumulative effect on a property’s historic character.¹

Considering that almost all cultural landscapes are composed of natural systems, managing change is a core function of preservation and stewardship and involves assessing how change contributes to, or detracts from, the character that allows a landscape to reveal its history. Everyone involved in preservation work draws upon a similar body of science, but landscape preservation involves far more interpretation given the need to intervene in natural processes to retain or shape character.

In order to be effective stewards of our national park cultural landscapes, changes in response to current environmental conditions, sustainability, and continued use must be con-

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Figure 1. Views from the Otter Cliffs area of Ocean Drive, Acadia National Park, Maine, 1920s (upper) and 2014 (lower). View and vista management is a great example of the need to actively intervene in natural processes to retain or shape character. Without intervention, views will be lost.

sidered. Adaptive strategies are often necessary to protect resources, meet natural resource objectives, accommodate visitor access and interpretation, and conform to site conditions that differ significantly from the historic period. As recent extreme weather events have highlighted, landscape stewardship strategies also need to consider climate vulnerability and adaptation.

The National Park Service Olmsted Center for Landscape Preservation assists national parks in preserving cultural landscapes through a variety of services. The center's work guides short- and long-term preservation and responds to a full spectrum of site management goals.. This article draws upon this work to highlight cultural landscape stewardship strategies that strive to balance the preservation of historic character with adaptation to changing environmental conditions and long-term sustainability.

Management of historic character

Cultural landscape stewardship requires a foundation for decision-making based on knowledge of a landscape's significance, physical evolution, and existing conditions. A critical component of this foundation is an understanding of a landscape's characteristics and features, and how they individually and collectively shape a landscape's historic character and aid in understanding its cultural value. What are the essential elements that, if lost, would significantly impact the ability of the landscape to reflect a sense of time and place in history? Based on this knowledge, an appropriate treatment strategy can be developed to guide stewardship activities, set priorities for preservation, and define parameters for altering historic conditions in response to a variety of contemporary issues.

At Saint-Gaudens National Historic Site, in Cornish, New Hampshire, the treatment strategy recognizes the importance of the sweeping westward views of Mount Ascutney and Juniper Hill; the role of the hemlock and white pine hedges in creating outdoor rooms for sculpture; and the form, color, and texture of the perennial garden.

Figure 2. View of Pan Statue, Little Studio to right and views of Mount Ascutney in the background at Saint-Gaudens National Historic Site, New Hampshire.



the qualities and extent of the historic views; size and composition of the hedges, along with replacement scenarios; and importance of perpetuating the tradition of garden craft and horticultural workmanship rather than a static planting plan. Changes based on maturing vegetation, pests and diseases, and maintenance are considered and incorporated as appropriate in the overall character management of the landscape.

During the past fifteen years, based on the 1999 general management plan, Gettysburg National Military Park has been implementing an ambitious landscape rehabilitation to restate the historic character of 1863. The rehabilitation is focused on the spatial organization, patterns of circulation, and small-scale features that were significant to the outcome of the battle. One of the rehabilitation tasks calls for replanting 160 acres of orchards to reflect conditions at the time of the battle. The treatment strategy developed to guide the rehabilitation states that, in general, the type of fruit in an orchard is not significant, but its contribution to the spatial organization of a farm, and thus to its use in battle, is. The historic limits and height of an orchard are the primary concern, as these qualities affected the cover and concealment, obstacle, or avenue of approach during the battle.²

To achieve the desired character, trees are planted on 40-foot centers using standard size apple or pear trees. Several varieties of modern disease and pest-resistant root stock are used, which yield trees that remain healthy with less intensive maintenance. Young trees are pruned using 19th-century pruning techniques, so that the resulting orchard has the general appearance, size, and height of the orchards at the time of the battle. The use of pesticides and herbicides is limited, as the orchards are not managed for fruit production but for their general appearance on the landscape. To date, approximately 3,100 trees have been planted throughout the park, re-establishing this important landscape feature and enhancing the ability of the landscape to convey its historic character.

A very different landscape character conveys the significance of the Dune Shacks Historic District in Cape Cod National Seashore in Massachusetts. This 1,500-acre vernacular landscape is composed of 19 wooden shacks nestled within the dunes along the seashore. The landscape is significant for its association with various prominent artists and writers in the early 1900s, such as playwrights Eugene O'Neill and Tennessee Williams. These shacks and their associated outbuildings have been moved, taken down by storms, and rebuilt many times during the past 90 years, and the landscape continues to evolve in response to both natural conditions and the continued use by present-day artists. Based on this character, the treatment strategy is focused on perpetuating use of the shacks as a remote inspirational retreat. Buildings will be preserved as close as possible to their historic character, but modern materials will be allowed, buildings may end up in different locations, and more environmentally efficient utilities will be installed. The goal is to retain the vernacular character and overall sense of place that has defined this landscape for almost a century.

Adaptation

Given the diverse array of cultural landscapes throughout the national park system, understanding a landscape's historic character provides a frame of reference for management deci-

sions. This knowledge is essential for determining the best strategies for long-term preservation to retain or shape character and respond to changes based on continued use and current environmental conditions.

Cultural landscape management practices are often modified in response to conflicting resource management goals and to incorporate best management practices and sound environmental principles. Dramatic change in environmental conditions may require compromises between historic accuracy and the realities of maintaining or recreating historic conditions. Adaptive strategies may be necessary to conform to site conditions that differ significantly from the historic period, meet natural resource objectives, accommodate visitor access and interpretation, and protect resources from fire, flood, and other threats.

Balancing multiple resource management goals. Historic conditions may be modified in response to vulnerable natural systems and for long-term sustainability. For example, historic plant palettes contain a wide variety of native and introduced species, and some of the introduced species can be highly invasive. Historic vegetation at Vanderbilt Mansion National Historic Site in New York includes barberry and English ivy. Given the invasive nature of these species, treatment recommendations specify non-invasive substitutions to perpetuate historic character while protecting the natural systems by eliminating the potential spread of invasive species into nearby forests.

The 45-mile historic carriage road system at Acadia National Park provides visitors with the opportunity to explore the mountains and valleys of the park. In response to extensive erosion after heavy rainfalls and during spring runoff, the existing drainage system was re-evaluated. One site adjacent to Eagle Lake was identified as a high priority for treatment because the existing culvert was undersized, causing washouts and pulling road sediment into nearby streams. In addition, the historic configuration of the culvert was causing harm to the fish populations, including native brook trout, due to their inability to migrate through the culverts. To ensure adequate drainage along the historic carriage road, protect nearby streams from sedimentation, and enhance the passage of aquatic organisms, the existing 24-inch, corrugated round metal culvert was replaced with a 6-foot-wide and 3-foot-high, galvanized steel open-bottom culvert. The new configuration required replacing the culvert's historic stone headwalls with new headwalls that are compatible in character. Modification of this historic feature was evaluated in the broader context of enhancing protection of the carriage road through improved drainage and allowing migration of native fish populations.

Incorporating sustainable management practices. The National Park Service *Green Parks Plan* (2013) defines a collective vision and a long-term strategic plan for sustainable management of park operations. As part of that vision, landscape management practices are being evaluated with respect to how we can conserve energy and increase our reliance on renewable energy, improve water use efficiency, limit the waste we generate, and mitigate the effects of climate change. This has resulted in multiple efforts to incorporate environmentally friendly practices in landscape maintenance, reduce the level of maintenance required, and build healthier, more self-sufficient systems.

Across the national park system, mowing turf grass is a significant source of greenhouse

gas emissions, as well as water usage, fertilizer, and herbicides. A reduction of mowing can help parks move toward a lower carbon footprint. In addition, organic turf and weed management practices can build a healthy soil community for long-term sustainability.

At Glenmont, Thomas Edison's home in New Jersey, a large portion of what is today maintained as mowed turf grass was historically a meadow maintained by grazing livestock. Conversion of this section of lawn to meadow will result in an increase in meadow species and a significant reduction in the frequency of mowing. This is an ideal situation that results in enhancing historic character and lowering the carbon footprint of maintenance practices.

In areas of the country with limited availability of water, including some recently plagued by severe droughts, alternative solutions to turf management are being considered. Historic Fort Baker in Golden Gate National Recreation Area in San Francisco was extensively rehabilitated in 2008 and is now home to Cavallo Point Lodge, which markets itself a sustainable luxury hotel, and the Institute at Golden Gate, a new environmental institute with a mission to advance the health, sustainability, and protection of our environment.³ The rehabilitation of the property included the historic parade ground. The park and the lodge operator wanted a parade ground that reflected its historic character and was also a model of sustainability.

The goals for the parade ground turf included use of native grass, reduction of water usage (with the eventual goal of eliminating irrigation altogether), and a limited need for mowing. Based on a number of test plots to evaluate the cover, growth, and color of different seed mixes (of particular concern was the color of the turf during the dry summer months), a turf cover of native and non-native grass was installed. Mowing is only necessary a few times a year, and the grass will be allowed to turn "golden" during the summer months. This approach presents a landscape character that is in keeping with the historic period, but is slightly modified, especially during the summer months, to address contemporary management goals.

Across the San Francisco Bay, a recent landscape treatment plan for Fort Mason proposed managing turf to reflect the historic landscape conditions under United States Army stewardship within the historic core of the district. However, recommendations were made to modify management practices on the perimeter of the district to increase the use of native species, reduce the use of irrigation, and enhance the capacity for rainwater to perme-

Figure 3. View of Historic Fort Baker parade ground with turf test plots installed to evaluate the cover, growth, and color of different seed mixes. The park and the lodge operator wanted a parade ground that reflected its historic character and also was a model of sustainability. Golden Gate National Recreation Area, California.



ate planted areas. In the 13-acre, non-historic portion of the landscape, known as the Great Meadow, the plan recommended a 32% reduction in the irrigated and mown lawn area by replanting turf areas along the perimeter with drought-tolerant native grasses.

Responding to diseases and pests. One of the major causes of change and loss of historic character is the damage to vegetation due to an increasing number of diseases and pests. As a result, an increasing number of cultural landscape treatment plans address the selection of substitute plant materials. The process used for selecting substitute plant species involves the application of objective weighting factors associated with a landscape's historic character, including design intent, adaptability to site conditions, establishment, maintenance requirements, and sustainability.

The development of a landscape management strategy for Rapidan Camp, President Herbert Hoover's summer retreat in Shenandoah National Park, Virginia, followed the death of nearly all of the eastern hemlock trees (*Tsuga canadensis*) from the hemlock wooly adelgid in the late 1990s. Rapidan Camp lies deep in a natural area, surrounded by hardwood forest, mountain streams, and critical habitat for native plants and animals. During the historic period, towering hemlock trees were a major character-defining feature, creating a high overhead canopy and providing deep shade beneath. The loss of the hemlock trees dramatically altered the character of the camp, opening the forest floor to sunlight and encouraging dense shrub and sapling growth.

While re-establishment of the hemlock canopy would reinstate the historic character of the camp, it would require a lengthy propagation program to generate seedlings from existing specimens. In addition, hemlocks continue to be vulnerable to the hemlock wooly adelgid, and replacement in-kind would require ongoing treatment with systemic pesticide to control the infestation. Given the environmental context of the camp and the feasibility of sustaining such an investment, the treatment strategy calls for a replacing the hemlocks with a substitute species. The surviving hemlock trees will be protected with pesticide treatment and propagated, preserving the possibility of re-establishing the hemlock grove at a future date if conditions become more favorable.

In consultation with park staff, and with technical assistance provided by the University of Tennessee Institute of Agriculture, Department of Forestry, Wildlife, and Fisheries, alternative management strategies were considered, including both native evergreen and deciduous species.⁴ Based on an analysis of soils, canopy cover, forest density, seedling regeneration, and predominate plant species, the final recommendation was to manage the landscape to allow the native tulip poplar trees (*Liriodendron tulipifera*) to grow into a canopy. Although tulip poplars would likely have represented a small component of the overall tree canopy during the historic period, the trees exhibit a number of desirable characteristics that make them a preferred species for canopy reestablishment. They are a pioneering species that is colonizing many of the areas opened to sunlight by the hemlock loss, grow quickly, and are long-lived. While the character of the deciduous tulip poplars will be quite different from the historic hemlock glen, management of existing trees will create the desired shaded character with minimal intervention and need for ongoing maintenance.

At Jefferson National Expansion Memorial in downtown St. Louis, a proactive response was taken to address the threat of the emerald ash borer to the memorial's historic designed landscape. The emerald ash borer is an exotic beetle that was discovered in southeastern Michigan near Detroit in the summer of 2002. The adult beetles nibble on ash foliage but causes little damage. The larvae (the immature stage) feed on the inner bark of ash trees, disrupting the tree's ability to transport water and nutrients, causing tree decline and mortality.

The grounds of Jefferson National Expansion Memorial are a critical component of this National Historic Landmark property. This significant contemporary landscape reflects the design collaboration between architect Eero Saarinen and landscape architect Dan Kiley. One of the most significant features of Kiley's landscape design is the white ash-lined walkways leading to Saarinen's 630-foot stainless-steel Gateway Arch. These allees are part of a monoculture composed of approximately 1,200 white ash "Rosehill" trees planted throughout the grounds.⁵ The monoculture planting defines the pedestrian experience and complements the simplicity of the Gateway Arch. According to the 2010 cultural landscape report:

The allées are a contributing landscape feature that defines the character of the Memorial landscape. They should be retained and maintained, including the location and spacing of trees, and the use of a uniform, single-species planting of tall, relatively straight-trunked, deciduous trees, creating a continuous canopy and sense of enclosure over the walks. Maintaining the Rosehill ash cultivar (*Fraxinus americana* 'Rosehill') in particular is not as important as maintaining these formal characteristics.⁶

In 2009, in response to the location of the emerald ash borer in Wayne County, Missouri, approximately 150 miles south of St. Louis, the park prepared an emerald ash borer management plan. The plan reaffirmed the preservation goal stated in the 2010 cultural landscape report of preserving the monoculture allee landscape feature, outlined a process for selecting substitute plant species for the Rosehill ash, and recommended an action plan for managing the existing Rosehill ash planting based on proximity of the insect to the park: the current 150-mile, a 50-mile, and a 15-or-fewer-mile confirmation.

A short list of trees was identified that had an appropriate height (50–70 feet) and habit, ability to tolerate alkaline soils, resistant to diseases and pests, and maintenance. After further consideration, the London plane tree (*Platanus acerifolia*) was selected as the preferred replacement species. In order to build in resilience from anthracnose and other problems with this monoculture planting, the plan recommended using diverse cultivars. As with many treatment strategies, there was no silver bullet for a substitute tree at the Gateway Arch. Instead, the final tree selection was based on several factors for how best to adapt the historic conditions in response to the environmental changes based on historic character, soil conditions, and maintenance.⁷

In 2010, the City Arch River 2015 Competition was awarded to landscape architect Michael Van Valkenburgh Associates, Inc. This project was initiated to celebrate the 50th anniversary of completion of the Gateway Arch, reimagine and enliven the grounds of the park, and enhance connections to the city and the Mississippi riverfront. In light of the pend-



Figure 4. View of the white ash-lined walkways leading to the 630-foot stainless steel Gateway Arch. Based on the threat of emerald ash borer, the trees are being removed and replaced with London plane trees. Jefferson National Expansion Memorial, Missouri.

ing loss of the ash trees, tree replacement was folded into the project and implementation is underway. To increase the viability of the new plantings, the project will also include re-engineering the soil composition and a new irrigation system.

It is important to note that, while Kiley's design included more than 1,200 ash trees throughout the Gateway Arch grounds, a decision was made to limit the monoculture planting to the sidewalk allees. Beyond the allees, proposed tree planting will conform to contemporary best management practices and include a diverse plant palate and greater use of native plants.

Preserving coastal heritage resources. Recent storms have demonstrated just how vulnerable some of our national park cultural landscapes are to damage and loss, especially those located along the coast. These landscapes present some of the greatest challenges to balancing the preservation of historic character with changes needed for climate adaptation and increased landscape resiliency.

The National Park Service is still in the process of repairing the damage caused by Hurricane Sandy in 2012 and recognizes the inevitability of another storm event. So what is the best strategy for protecting resources and minimizing future damages?

Given the location of the Statue of Liberty, the landscape at Liberty Island will always remain extremely vulnerable to storm damage. At the Arrival Mall of Liberty Island are evenly-spaced London plane trees which frame the promenade leading to the Statue of Liberty

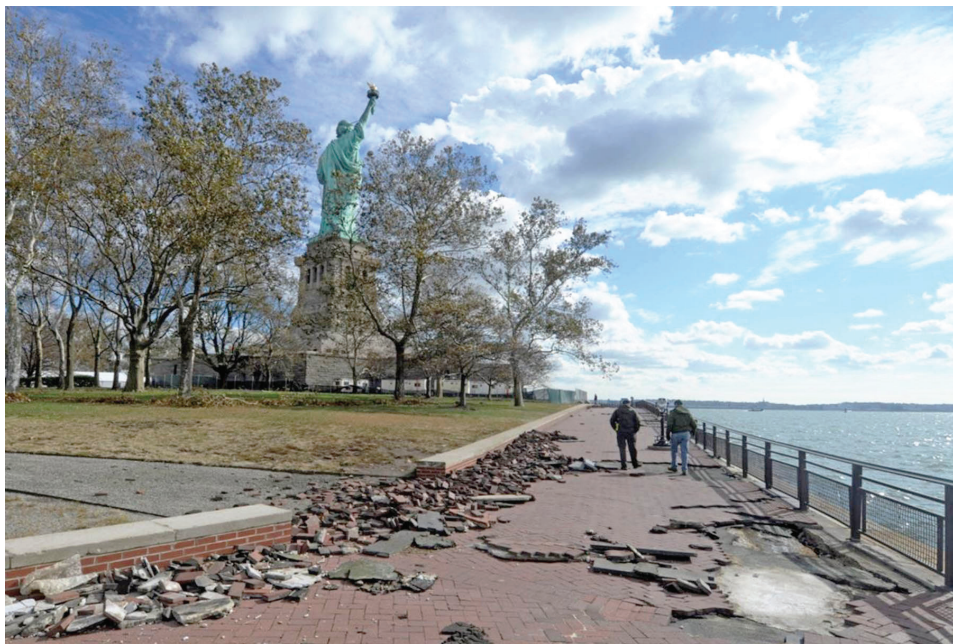


Figure 5. View of storm damage caused by Hurricane Sandy in 2012. Given the location, the landscape at Liberty Island will always be vulnerable to storm damage. Statue of Liberty National Monument, New York.

and provide a green canopy. As a result of the storm, most of the trees are dead or dying. As part of the repair work underway, recommendations have been made to replace the damaged London plane trees with salt-tolerant shade trees that are similar in character, such as white oak, in order to increase landscape resiliency. To preserve the historic character, the recommendations specify that trees along the promenade be single-trunk specimen trees, planted in the same location with the same spacing as the existing plane trees. In addition, soil conditions should be improved to allow for greater soil flushing, reducing the impact of salt when overwash occurs.

Striking a balance between preserving historic character and the changes needed for climate adaptation should always be the first priority. However, there are certain cultural landscapes that may require an entirely new design and management approach to respond to the increase in threats and damage as a result of climate changes.

The damage Hurricane Sandy caused to Jacob Riis Park in Gateway National Recreation Area in New York has raised a number of questions regarding the best approach for its long-term management. Built by Robert Moses in the 1930s, the landscape provides a wonderful recreational resource for New York City. The site has always been vulnerable to storm damage; however, the recent impacts are much greater. Five years ago a landscape rehabilitation plan was prepared for the park. Part of that plan called for the replacement of a historic cast-steel railing along the boardwalk adjacent to the beach. As a result, the railing was replaced with cast aluminum railing that replicated the historic design, at quite an

expense. This approach could easily be considered a model of good preservation practice. Unfortunately, in 2013, Hurricane Sandy seriously damaged most of the new railing. The question the park is now facing is, in this context, should we be considering a new design for the entire landscape that is more resilient to storm damage, and where the investment of precious dollars is not wasted?

Need for strategic planning

Recent storms have clearly demonstrated the damage that can result from a single event. Changes based on rising temperatures or diseases and pests may occur over a much longer time period, yet the impacts can be as devastating as a single storm. Both scenarios have the potential to radically alter the historic character of the landscape that we are trying to preserve.

In the context of this changing environment, we need to be more proactive in identifying potential threats, planning for anticipated changes or events, and defining appropriate mitigation measures. To do so, a solid information base is essential to guide decisions about long-term preservation. Baseline inventory efforts should be prioritized to focus on vulnerable cultural landscape resources. For the most vulnerable, such as coastal landscapes, a documentation initiative should be launched to ensure that these resources are fully recorded if lost.

To guide investments in resource management, treatment planning must fully consider climate adaptation, sustainability, and resilience. These factors need to be seen within the construct of rehabilitation and balancing contemporary site issues with preservation of historic character. In addition, it is important to recognize the role of preservation maintenance in landscape resiliency. We have seen the extent of the damage to cultural resources caused by events such as Hurricane Isabel in 2003 or Hurricane Isaac in 2012 and, most recently, Hurricane Sandy. But we have also seen that landscapes in good condition are far more resilient and the damage caused by storms is less extensive. So, a large part of the strategy to increase landscape resilience lies in basic care-taking.

Conclusion

The examples shared in this article highlight the critical role of managing change in cultural landscape stewardship, along with a variety of approaches to respond to current environmental conditions, sustainability, and continued use. We need to be able to clearly articulate the values and character that are most important to ensure that, if at all possible, proposed changes do not alter the inherent value and character we are charged with preserving. Armed with an understanding of a landscape's significance, existing conditions, and historic character, we can play a critical role as problem solvers within a larger context of resource management.

Today, we are just beginning to explore how we can successfully incorporate climate adaptation and landscape resilience in preservation goals and strategies. While climate adaptation and landscape resilience historically have not been part of cultural resource management terminology, these are not foreign concepts in preservation practice, especially in cultural landscape stewardship. In preservation terms, the majority of our stewardship activity

involves rehabilitation—and rehabilitation is adaptation based on a variety of circumstances, such as contemporary use, accessibility, natural resource values, and sustainability.

As we look toward the future, cultural landscape stewardship will continue to approach treatment with the goal of attaining the highest degree of integrity and authenticity possible. However, we can anticipate that the management issues that need to be addressed will increase and be more complex, and will likely require a greater degree of flexibility and a consideration of many more options to achieve preservation goals.

In considering adaptation strategies for a property, we need to take a holistic view and involve expertise in multiple areas of resource and facility management. In addition, we need to collaborate across park and agency boundaries to share expertise and knowledge. Landscape preservation practice is well versed in managing change and adapting to a variety of circumstances in a manner that ensures preservation of a landscape's essential qualities. I believe this will serve us well as we explore how to address climate adaptation and landscape resilience in preservation goals and strategies.

Endnotes

1. National Park Service, *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (Washington, DC: NPS, 1995).
2. The exception to this understanding is named orchards that are now commemorative in nature, such as the Peach Orchard; Eric Campbell, *Treatment Philosophy: The 1863 Landscape* (Gettysburg, PA: Gettysburg National Military Park, 2004).
3. Cavallo Point is LEED Gold Certified.
4. Jennifer Franklin, "Rapidan Camp Cultural Landscape Technical Assistance" (unpublished report, Department of Forestry, Wildlife, and Fisheries, University of Tennessee, 2012).
5. Kiley's original design called for tulip poplars based on their scale, stature, and fast growth. Prior to implementation, local nurserymen, political leaders, and citizens voiced a public debate regarding the use of tulip poplars. As a result, a substitute, the Rosehill ash, was chosen to replace the tulip poplar.
6. AECOM, Inc., *Cultural Landscape Report, Jefferson National Expansion Memorial, St. Louis, Missouri* (St. Louis: National Park Service, 2010).
7. At the time of purchase, the lack of varieties available in the market resulted in a single variety being selected, the 'Bloodgood' London plane tree. Anticipating some mortality, the plan is to diversify over time as other varieties become available.

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