National Park Service
U.S. Department of the Interior

Vicksburg National Military Park
Vicksburg, Mississippi

Vicksburg National Military Park
Environmental Assessment for the Cultural Landscape Report

May 2009

Vicksburg National Military Park

Environmental Assessment for Landscape Rehabilitation

May 2009

Prepared for the National Park Service, U.S. Department of the Interior

by

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EXECUTIVE SUMMARY

Vicksburg National Military Park (NMP) (the park) and Vicksburg National Cemetery are located in Vicksburg, Mississippi, and comprise a unit of the National Park Service (NPS). The park and national cemetery combined encompass more than 1,800 acres and form one of the more densely monumented battlefields in the world with more than 1,340 monuments, markers, tablets, and plaques that dot the historic landscape. The park includes historic earthen fortifications, reconstructed trenches and other military features, historic bridges, historic buildings, historic cannon/carriages, a visitor center, the *USS Cairo* gunboat and museum, and 17 miles of tour roads that document the components of the Union and Confederate armies during the siege. NPS faces many challenges associated with the long-term management and maintenance of the park. As part of the planning process intended to support decisions regarding management of the park, NPS is preparing a Cultural Landscape Report (CLR) for Vicksburg NMP. The CLR is intended to provide NPS with an assessment of the character-defining features of the Vicksburg NMP landscape, document historic and existing conditions, and develop specific treatment recommendations to ensure the future protection of the park and its natural and cultural resources (NPS, 2009). This Environmental Assessment (EA) analyzes the Preferred Alternative and the other proposed alternatives in the CLR and their impacts on the environment.

The purpose of Vicksburg NMP (NPS, 1980) is given below:

> *Congress established Vicksburg National Military Park on February 21, 1899, "to commemorate the campaign and siege and defense of Vicksburg, and to preserve the history of the battles and operations of the siege and defense on the ground where they were fought and were carried on …"*
>
> *On September 17, 1990, Congress further directed the Secretary of the Interior to "interpret the campaign and siege of Vicksburg from April 1862 to July 4, 1863, and the history of Vicksburg under Union occupation during the Civil War and Reconstruction."*
>
> *In July 1862, Congress enacted legislation initiating the establishment of National Cemeteries, "for the burial of deceased soldiers and sailors." The Vicksburg National Cemetery was established in 1862 by authority of this act.*

Today, the Vicksburg battlefield bears little resemblance to the landscape at the time of the siege. NPS management practices since the establishment of the park have allowed parklands to be naturally reforested. Areas that were once cleared during the siege are now forested as a result of natural vegetative regeneration and plantings by the Civilian Conservation Corps in the 1930s to reduce soil erosion. These areas now provide important wildlife habitat in a unique loess soil bluff environment. If an informed, comprehensive plan for landscape rehabilitation is not developed and implemented, then the existing park condition will continue to misrepresent the historic battlefield condition and potentially reduce visitor understanding of the events the park commemorates. There could also be negative impacts on natural resources and habitat if future restoration efforts are implemented piecemeal without adequately considering cumulative environmental consequences (NPS, 2009).

The EA seeks to provide a clear direction to manage the landscape in ways that commemorate the campaign, siege, and defense of Vicksburg, as required by Congress, by preserving resources and enhancing visitor understanding and appreciation of the events that occurred here while providing a variety of experiences and complying with other laws and regulations.

Under Alternative A, the current management operations and conditions would be continued without substantial modification. This "no action" alternative provides a basis for comparing the management direction and environmental consequences of the other action alternatives.

Under Alternative B, Vicksburg NMP would preserve resources by applying Best Management Practices to areas within the park. Interpretation would become the primary means for commemoration and communication of the site history to the visitor. This alternative would involve the development of new exhibits, waysides, signage, and other interpretive features at different locations around the park. Also, three 10-acre sites would be converted to a new landcover type intended to best protect against soil erosion based on the recommendations of local ecologists and plant scientists. These sites would be monitored and the approach adapted based on evaluation of the success of the resulting plant communities. Additional areas of the park would then be converted over time using this adaptive approach.

Under Alternative C, Vicksburg NMP would rehabilitate the park landscape, primarily by rehabilitating Civil War military resources. Alternative C would implement landcover changes within the park to reveal the historic landscape of the Civil War siege in the areas that collectively represent physical resources at key military engagement sites for meeting the legislative mandate of the park to "commemorate the campaign and siege and defense of Vicksburg," and "restore the forts and the lines of fortifications, the parallels and the approaches of the two armies, or so much thereof as may be necessary to the purposes of the park." Identification of the key areas was based on careful review and understanding of the military terrain that molded the events of September 1862 through July 1863 and its ability to convey the full range of important military events and activities that occurred there. Preservation and stabilization of important natural, cultural, and historic resources are assumed under rehabilitation. Rehabilitation accommodates new uses and can make historic associations more apparent. Furthermore, enhanced interpretive, park operations, and visitor use and experience elements would be included in Alternative C.

Under Alternative D, an extensive area of Vicksburg NMP would be rehabilitated by the removal of woodlands to reveal a broad spectrum of sites of military engagement. Alternative D assumes that interpretation and education of visitors would feature authentic connections between physical resources and military events, using military terrain analysis as the basis for revealing the key stories associated with the Vicksburg landscape. Implementation of Alternative D would enhance the legibility of Civil War-era resources and associations through the removal of forest cover that has grown up since the end of the siege and currently obscures many visual and physical relationships that were important to the events that occurred at Vicksburg in 1863. Tree clearing would occur in areas identified through military terrain analysis as key to the battle and siege tactics of Union and Confederate commanders, and to its understanding. Interpretation would be provided to help visitors understand what happened within these modified areas. Later additions to the landscape that support visitor use of the park and NPS administration of the site, as well as late 19th and early 20th century commemoration of the Civil War, would be retained to interpret the park's enabling legislation. Alternative D assumes that the best way to "commemorate the siege and preserve the history of the battles and operations of the siege and defense on the ground where they were fought and were carried on …" is to reveal the landform, topography, and earthen fortifications associated with Union and Confederate lines and the landscape that was modified to offensive and defensive purposes between them.

Based on comments received from the public, and after a "Choosing by Advantages" NPS process, Alternative C was selected as the Preferred Alternative. Alternative C provides visitors with the highest level of historic interpretation and diverse experiences while reducing environmental impacts.

The EA has been distributed to other agencies and interested organizations and individuals for their review and comment. The public comment period for this document will last for 30 days after the

document has been distributed to the public. Please refer to the next page to see "How to Comment on this Plan."

HOW TO COMMENT ON THIS PLAN

Comments on this plan are welcome and will be accepted for 30 days after the document is distributed to the public. Comments/responses to the material may be submitted either over the Internet or in writing. Please include your name and address on any correspondence to be sure that you are included on our mailing list. Commenters are encouraged to use the Internet if possible through the NPS Planning, Environment, and Public Comment website at the following address: http://parkplanning.nps.gov/VICK/.

Written comments may be sent to:

Vicksburg National Military Park
Cultural Landscape Report/Environmental Assessment Comments
3201 Clay Street
Vicksburg, MS 39183-3495

Important Notice: Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

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ACRONYMS

ACHP	Advisory Council on Historic Preservation
APE	Area of Potential Effect
AQA	Air Quality Act
BMP	Best Management Practice
C	Celsius
CAA	Clean Air Act
CBA	Choosing by Advantages
CCC	Civilian Conservation Corps
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CLR	Cultural Landscape Report
CWA	Clean Water Act
DO-12	Director's Order 12
EA	Environmental Assessment
EO	Executive Order
ESA	Endangered Species Act
F	Fahrenheit
FEMA	Federal Emergency Management Agency
GMP	General Management Plan
GPS	Global Positioning System
MDEQ	Mississippi Department of Environmental Quality
MNHP	Mississippi Natural Heritage Program
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMP	National Military Park
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
PL	Public Law
ppm	Parts per Million
SHPO	State Historic Preservation Office
SOF	Statement of Findings
SWPPP	Stormwater Pollution Prevention Plan
the park	Vicksburg NMP
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USS	U.S. Ship
VICK	Vicksburg National Military Park

1. INTRODUCTION, PURPOSE AND NEED FOR ACTION

1. INTRODUCTION, PURPOSE AND NEED FOR ACTION

INTRODUCTION

This "Introduction, Purpose and Need for Action" section describes why the National Park Service (NPS) is evaluating alternative cultural landscape treatments at Vicksburg National Military Park (NMP) (the park).

Vicksburg NMP is located in Vicksburg, Warren County, Mississippi (Figure 1-1). The park consists of six noncontiguous parcels. These include the main battlefield unit, Louisiana Circle, South Fort, Navy Circle, Grant's Canal, and Pemberton's Headquarters. Vicksburg National Cemetery abuts the park and is administered by NPS.

Vicksburg NMP and Vicksburg National Cemetery comprise more than 1,800 acres. The park includes more than 1,340 monuments, 16 miles of tour roads, and many earthen fortifications that document the components of the Union and Confederate armies during the Civil War siege of Vicksburg. NPS faces many challenges associated with the long-term management and maintenance of the park. As part of the planning process intended to support decisions regarding management of the park, NPS is preparing a Cultural Landscape Report (CLR) for Vicksburg NMP. The CLR is intended to provide NPS with an assessment of the character-defining features of the Vicksburg NMP landscape, document historic and existing conditions, and develop specific treatment recommendations to ensure the future protection of the park and its natural and cultural resources (NPS, 2009). The main battlefield unit (Figure 1-2) is the primary focus of the CLR, although the three small forts along the Mississippi River (South Fort, Louisiana Circle, and Navy Circle) are also addressed in the CLR. This Environmental Assessment (EA) analyzes the preferred alternative and the other proposed alternatives in the CLR and their impacts on the environment.

Today, the Vicksburg battlefield bears little resemblance to the landscape at the time of the siege. NPS management practices since the establishment of the park have allowed parklands to be naturally reforested. Areas that were once cleared during the siege are now forested as a result of natural vegetative regeneration and plantings by the Civilian Conservation Corps (CCC) in the 1930s to minimize soil erosion. These areas now provide important wildlife habitat in a unique loess soil bluff environment. If an informed, comprehensive plan for landscape rehabilitation is not developed and implemented, then the existing park condition will continue to misrepresent the historic battlefield condition and potentially reduce visitor understanding of the events the park commemorates. There could also be negative impacts to natural resources and habitat if future restoration efforts are implemented piecemeal without adequately considering cumulative environmental consequences (NPS, 2009).

The CLR will also be used in support of an updated parkwide General Management Plan (GMP), a Comprehensive Long-range Interpretive Plan, and associated compliance as required by the National Environmental Policy Act (NEPA) of 1969, as amended. It will also be used to guide any additional landscape treatments beyond the initial landscape treatments discussed in the EA. The GMP and Comprehensive Long-range Interpretive Plan are essential tools that will help guide future management of the park's resources (NPS, 2009). NPS is the lead agency in this NEPA analysis. There are no cooperating agencies involved in this NEPA analysis.

Figure 1-1 Vicksburg National Military Park Site Location Map

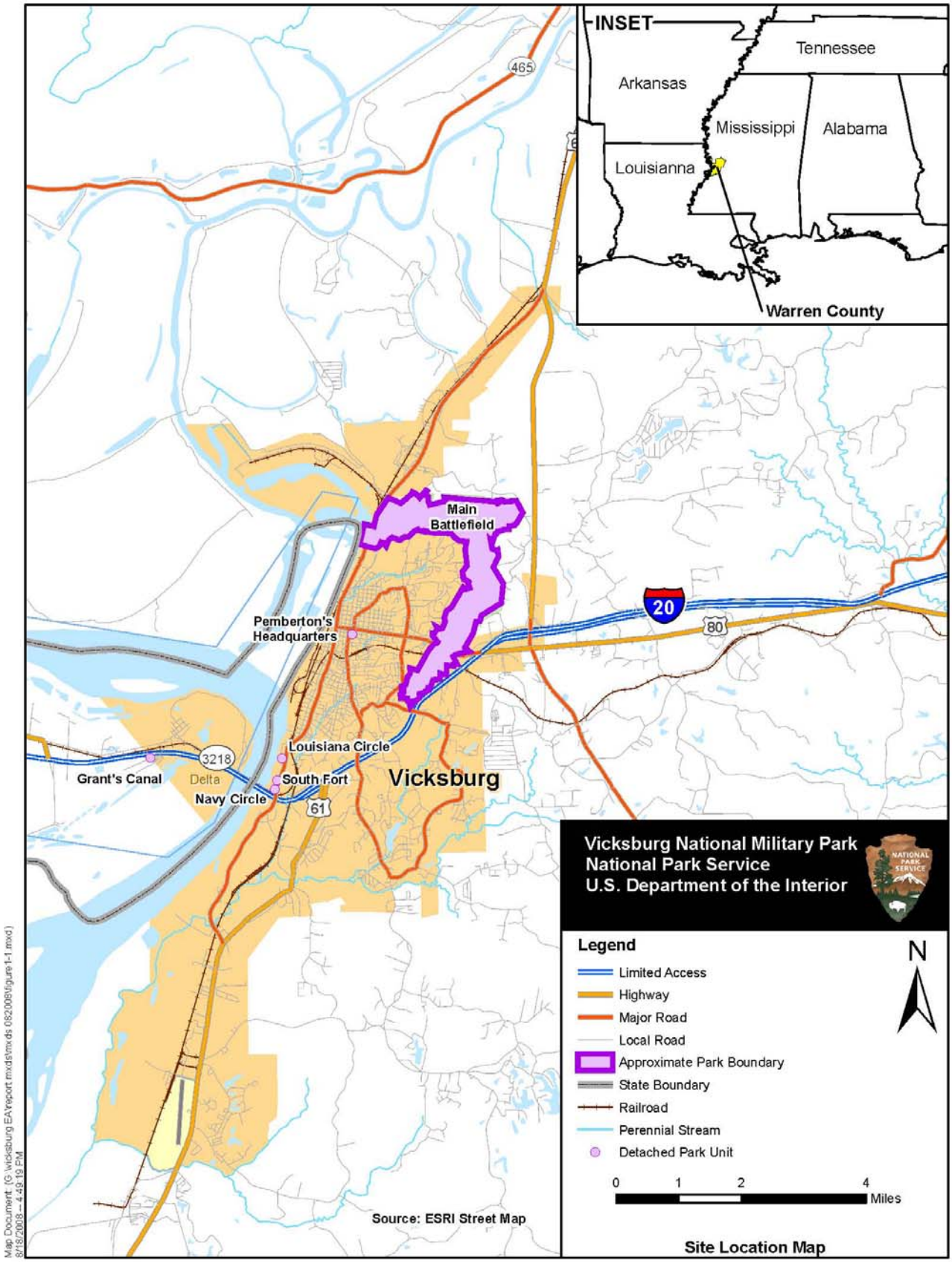


Figure 1-2 Vicksburg National Military Park Main Battlefield Areas

PURPOSE AND NEED FOR THE ACTION

"Purpose" is a statement of goals and objectives that NPS intends to fulfill by taking action. "Need" is a discussion of existing conditions that need to be changed, problems that need to be remedied, decisions that need to be made, and policies or mandates that need to be implemented. In other words, it explains why Vicksburg NMP is proposing this action at this time. "Objectives" are goals the park must accomplish for the actions taken to be considered a success (NPS, 2001).

Purpose

The purpose of this EA is to guide landscape treatment and maintenance so that the park meets its mandate to "commemorate the campaign, siege and defense of Vicksburg, and to preserve the history of the battles and operations of the siege and defense on the ground where they were fought and were carried on. …" The park's authorizing legislation further includes specific actions to meet the overall purpose: "to restore the forts and the lines of fortification, the parallels and approaches of the two armies, or so much thereof as may be necessary to the purposes of the park." This EA seeks to provide a clear direction to manage the landscape in ways that commemorate the campaign, siege, and defense of Vicksburg, as required by Congress, by preserving resources and enhancing visitor understanding and appreciation of the events that occurred here while providing a variety of experiences and complying with other laws and regulations.

Need

The park needs to analyze the landscape comprehensively and determine if and what changes are warranted to enhance preservation of the landscape's historic character and integrity and improve visitor understanding and experience.

Objectives

The Vicksburg NMP project team developed five objectives of the CLR. The objectives are provided below.

1. To facilitate understanding and interpretation of the park story, including:
    a. Campaign (primary theme)
        i. Topography/features/struggles/achievements
        ii. Confederate use of landscape/defensive plan
        iii. Union use of landscape/offensive plan
        iv. Proximity of river/city/fortifications
    b. Context (secondary theme)
    c. Establishment/commemoration (secondary theme)
        i. Helps understand why and where monuments are located
    d. CCC (secondary theme)

2. To experience history up close:
    a. Enhance the visitors' immersion in the resource
        i. Encourage visitors to leave their cars to experience the park firsthand
        ii. Provide interpretative experiences faithful to the park's purpose
        iii. Make the park's story relevant to visitors' lives today
    b. Enhance outreach and educational opportunities

3. To protect physical features and resources from degradation:
   a. Vandalism
   b. Wear and tear
   c. Relic hunting
   d. Erosion

4. To provide opportunities for a variety of visitor experiences while maintaining the historic character and integrity of the landscape and managing visitor use conflicts:
   a. Habitat
   b. Wildlife
   c. Trails/paths
   d. Water resources

5. To develop sustainable ways of maintaining the landscape:
   a. Methods
   b. Costs

PURPOSE AND SIGNIFICANCE OF VICKSBURG NMP

The purpose of Vicksburg NMP (NPS, 1980) is given below:

Congress established Vicksburg NMP on February 21, 1899, "to commemorate the campaign and siege and defense of Vicksburg, and to preserve the history of the battles and operations of the siege and defense on the ground where they were fought and were carried on. …"

On September 17, 1990, Congress further directed the Secretary of the Interior to "interpret the campaign and siege of Vicksburg from April 1862 to July 4, 1863, and the history of Vicksburg under Union occupation during the Civil War and Reconstruction."

In July 1862, Congress enacted legislation initiating the establishment of National Cemeteries, "for the burial of deceased soldiers and sailors." Vicksburg National Cemetery was established in 1862 by authority of this Act.

Vicksburg NMP is significant because:

- Vicksburg's topography features unique steep ridges and ravines, loess terrain, and 200-foot-high bluffs, located on an oxbow of the Mississippi River. Although the river's course has changed, many attributes of the land and of the overall Vicksburg campaign landscape persist today. The Vicksburg area has been a long-time focus for settlement and point from which the river could be controlled.
- Control of the Mississippi River, which supported and enhanced commerce throughout the nation and facilitated transport of essential military supplies, was a strategic objective of the Northern and Southern armies, and defined both the Western Campaign of the Civil War and the trans-Mississippi campaigns of the Civil War. Simultaneous Union victories at Vicksburg and Gettysburg in July 1863 marked a decisive turning point in the Civil War.
- The crossroads of river, rail, and highway at Vicksburg, combined with imposing defenses and a critical strategic objective, produced one of the most complex and protracted engagements of the Civil War, and involved joint operations between the Army and Navy; overland and over-water troop movements; and tactics of diversion, siege, and defense.

- The accomplishments of the U.S. Colored Troops in the Vicksburg Campaign proved their resolve and ability to effectively fight, which resulted in an ensuing surge of enlistment of blacks in the Vicksburg army, and a growing respect for their bravery in combat.
- Following the siege of Vicksburg, the Union garrison that remained used Vicksburg as a base of operations for raids, expeditions, commerce, and communications that continued to assist Northern operations for the remainder of the War.
- The monuments at Vicksburg constitute one of the largest collections of significant commemorative military art in the United States, and one of the most extensive collections of such art in the world. Representing the states involved, the monuments and memorials, with their varied symbolism, commemorate the campaign, siege, and defense of Vicksburg. New monuments continue to be added, including the recent memorial to black soldiers—the park's first monument to the U.S. Colored Troops.
- The preserved remains of the *USS Cairo* constitute the only surviving city-class gunboat constructed using the most advanced technology of the Civil War era, including steam propulsion, ironclad armor, and shallow-draft design. This technology changed the strategy and tactics of naval warfare on western rivers and was essential to the Union fleet and the effort to secure control of the Mississippi River.
- Vicksburg's society was transformed by war, enduring changes that ranged from deprivation and destruction of a prosperous community to liberation of formerly enslaved people.
- Reconstruction efforts at Vicksburg following the War reflected changes occurring in regional and national politics, economies, and society. Vicksburg became a microcosm of these changes and their consequences.
- Vicksburg National Cemetery honors service men and women of several wars by properly caring for their remains. It contains more Union Civil War soldiers than any other cemetery in the country, and includes the graves of many U.S. Colored Troops and unknown soldiers. The cemetery provides opportunities for personal connections with those who died during events that have shaped our present-day nation.
- Vicksburg NMP is one of the first five NMP established through the steadfast efforts of Union and Confederate veterans who experienced war firsthand on its grounds. It exists as a memorial to the soldiers and sailors who fought there and perpetuates remembrance of their history for the benefit of current and future generations, both nationally and internationally.
- Vicksburg NMP, with its cultural and natural resources, today plays a vital role in our nation's heritage and provides a place of peace, reflection, enjoyment, and community engagement.

RELATIONSHIP TO OTHER PROJECTS AND PLANS

The following projects, plans, policies, and actions could affect the alternatives being considered in this EA. The actions proposed in the CLR would be in accordance with ongoing and future plans for management of Vicksburg NMP. These plans and policies have been considered in the development of the alternative, were used to provide background information for this plan, and were also considered in the analysis of cumulative impacts.

Other Projects

Transportation Projects

Several completed, ongoing, and future transportation projects were noted in the EA prepared for the repair of Connecting Avenue (NPS, 2005):

Repair of Tour Road on Connecting Avenue. This project, completed in 2005, was to repair approximately 380 feet of Connecting Avenue along Fort Hill that was experiencing serious erosion problems. The repair and stabilization involved the construction of a sheer key buttress to support the roadway.

South Loop Tour Road. This project, in progress, consists of rehabilitation of the park's 3-mile one-way South Loop tour road by reconstructing deteriorated areas of roadway. This includes removing asphalt, base aggregate, and loess soil, and replacing them with fill material to obtain desired density for load limits. Work also includes milling four parking areas and three bridges and overlaying 2.8 miles of roadway. Six miles of non-mountable concrete curb will be installed and repaired or replaced. Fifteen funnel drains to control roadway runoff will be installed.

Confederate Avenue. This project, in progress, will reconstruct deteriorated areas of Confederate Avenue, overlay asphalt portions, replace failed gutters and curbs, and install new curbs as needed throughout the entire 5-mile road to allow drainage control. Because of the age and the shifting ground conditions of loess soils, the concrete has failed in many areas, causing road base problems and erosion, which threaten surrounding landscapes.

Park Tour Road. This proposed project consists of developing conceptual designs for replacement of all the park's mylan arch bridges and obtaining State Historic Preservation Office (SHPO) concurrence.

*Pemberton Avenue***.** This project consisted of repairing sections of the concrete pavement and milling and overlaying asphalt portions along this road.

Reversal of Tour Road Direction. This long-range project would involve reversing the current traffic direction along the main tour road from counterclockwise to clockwise and would include road rehabilitation and relocation, signage replacement, and the potential for road realignments in the vicinity of the park entrance and visitor center. A preliminary planning study for this project is proposed to begin in 2010. A separate NEPA compliance document and supporting information would be necessary for this project to determine its impact on the natural and cultural environment.

Additional transportation projects include the current rehabilitation of Connecting Avenue (2009), construction of two parking areas and a sidewalk to the Kentucky Monument (2009), the rehabilitation of Maloney Circle Road bridge (2011), and the resurfacing and striping of the *USS Cairo* Museum parking lot (2012).

Erosion Control Projects

Due to the nature of the loess soils found in and around Vicksburg NMP, a series of soil erosion control projects has been implemented since the inception of the park. In the 1930s, CCC established four camps within the park to complete a series of erosion control projects. These projects entailed installing concrete drains and gutters, grading and seeding slopes with grass, and planting a dense forest. The forestation project proved ineffective because tree roots held the soil but exposed roots channeled the

water from runoff (NPS, 2005). Throughout the last 60 years, NPS has had to conduct numerous other mitigation projects to combat erosion.

In 2004, the park instituted a preventative maintenance project directly behind the park's ranger cache. This project, categorically excluded under NEPA, impacted 0.3 acre, which was cleared of its vegetative cover. This was done to prevent landslides and tree fall from negatively impacting the physical structure of the cache.

In 2007, a drain and gutter system was installed at Long Bridge to prevent erosion. Also in 2007, erosion was repaired at the Wisconsin Monument.

Battlefield Restoration Projects

Until the 1930s, Vicksburg NMP was able to closely resemble the terrain and vegetative pattern that was experienced during the siege of 1863. However, in 1933, NPS enacted several projects to combat erosion, which included planting nearly 800 acres of trees throughout the park. By the 1980s, due to lack of funding to control invasive tree infestations and maintain some of the open grassy areas, woody vegetation encompassed approximately 1,100 acres of the approximately 1,800 acres that make up the park. By 1998, the park decided to return a portion of the park to its pre-1933 condition. These projects included the following:

- In 1998, the park cleared 13 acres along the South Loop and cleared 5 acres of tree cover near the Louisiana Monument.
- In 2003, the park cleared trails that had become overgrown since the 1980s near and including Old Jackson Road. This project cleared land of its tree cover to prevent landslides and negative impacts on the physical structure of the cache from falling trees.
- In 2003 and 2004, 14 separate parcels of land along the South Loop totaling 4 acres in size were identified and marked for revegetation.
- In 2005, 10 acres of forest in the area of Railroad Redoubt was rehabilitated by clearing vegetation from the historic battlefield to improve the interpretive potential of the landscape.
- One project that may occur in the future if funding becomes available would impact 1.58 acres of woodland (including 0.08 acre of wetland) between Vicksburg National Cemetery and Mint Spring Bayou. This project would prevent the further erosion of the bluff above the bayou that is severely eroding into the cemetery.

Additional ongoing projects and planned projects for Vicksburg NMP and are listed below:

- 2009 – Contract Workers to Control Chinaberry Tree Species
- 2009 – Install Fire Detection/Suppression System in Historic Shirley House
- 2009 – Paint Exterior of Historic Shirley House
- 2009 – Rehabilitate Living History Area
- 2009 – Replace Deteriorated Historic Cannon Carriages
- 2009 or Later – Complete Previously Unfunded Accessibility Modifications at Pemberton Headquarters
- 2010 – Hazard Tree Management at Navy and Louisiana Circles and South Fort
- 2010 – Hazard Tree Removal at South Loop
- 2010 – Hazard Tree Removal from Connecting Avenue to Entrance (Arch)
- 2010 – Hazard Tree Removal from Entrance (Arch) to Old Graveyard Road

- 2010 – Hazard Tree Removal from Old Graveyard Road to Connecting Avenue
- 2010 – Monument and Survey Park Boundary
- 2010 – Restoration of Iowa Monument
- 2011 – Replace Deteriorated Historic Cemetery Headstones

Vicksburg NMP Planning Documents

General Management Plan

Vicksburg NMP's 1980 GMP states that the park's primary purpose is "to maintain and, where necessary, restore the historical integrity of the sites, structures, and objects significant to the commemoration and interpretation of the Civil War history of Vicksburg." In conjunction with this aim, the park's general management objectives include:

- Maintaining existing open fields and limited vistas to meet interpretive needs, and restoring portions of the battlefield to an approximation of its appearance during the siege of Vicksburg
- Providing means for protection of park resources, including minimizing erosion

Resource Management Plan

Objectives addressed in Vicksburg NMP's statement for management and its 1997 Resource Management Plan that are pertinent to cultural landscape treatments include:

- Minimizing damage to the park's historic resources and infrastructure from erosion
- Minimizing damage to the park's historic resources from air pollution
- Maintaining the park boundaries in a well-marked, easily identifiable condition

SCOPING AND PUBLIC INVOLVEMENT

In June 2007, an EA newsletter was distributed and posted to the park website to cultivate public interest. Comments were accepted from June 4 through July 26, 2007, and an open house was conducted to present research findings on the EA on June 26, 2007. Public input and comment were requested at the open house.

Early coordination notifications were sent in September 2007 to the U.S. Fish and Wildlife Service (USFWS); the Mississippi Department of Environmental Quality (MDEQ); the Mississippi Forestry Commission; the Natural Resources Conservation Service (NRCS); the Mississippi Department of Archives and History; the U.S. Army Corps of Engineers (USACE); the U.S. Geological Survey (USGS); and the following tribes: the Chickasaw Nation, the Jena Band of Choctaw Indians, the Mississippi Band of Choctaw Indians, the Choctaw Nation of Oklahoma, the United Houma Nation, and the Tunica-Biloxi Tribe (Appendix A). Project review and comment were elicited from each notification recipient. As of February 2009, Vicksburg NMP has received responses from USFWS and USACE.

In November 2007, the project team reviewed and evaluated public comments received in June and July 2007, and developed and refined the draft purpose, need, objectives, issues, impact topics, and alternatives at an internal scoping meeting.

In April 2008, a second EA newsletter was distributed and posted to the park website at http://www.nps.gov/VICK/ and to the NPS Planning, Environment, and Public Comment website at

http://parkplanning.nps.gov/VICK/. Comments were accepted from late March through early May 2008, and an open house was conducted in April 2008 to present the purpose and need for the study and the draft alternatives for the CLR and the EA. Public input and comment were requested at the open house and were received through May 2008.

Additional public comment was afforded in June 2009. Public comments were reviewed, evaluated, and incorporated into this draft EA.

ISSUES AND IMPACT TOPICS

Issues

"Issues" often describe concerns or obstacles to achieving a park goal (NPS, 2001). Issues were identified by NPS through internal, public, and agency scoping. USFWS, MDEQ, and other federal and state agencies, as well as tribal entities and members of the public, were afforded the opportunity for their input into these issues.

Based on the October 2007 scoping meeting, the project team drafted the following issues:

1. Additional measures are needed to enhance interpretation of Union and Confederate military objectives during the siege of Vicksburg to comply with the park's enabling legislation.
2. Visitors appreciate the natural landscape; however, visual interpretation and understanding of the military objectives are difficult because the current landscape now obscures lines of sight to battlefield features.
3. Visitors generally do not experience park resources up close.
4. Landscape changes would impact:
    a. Wildlife habitat
    b. Park aesthetics
    c. Soil erosion
    d. Wetlands
    e. Surface water quality and temperature, and streamflow characteristics
    f. Maintenance requirements
    g. Visitor experience
    h. Prehistoric and historic archeological resources
    i. The only public forested area within urban Vicksburg
    j. Viewscapes
5. Physical features and resources of the park are vandalized.
6. Soil erosion threatens military earthworks, archeological resources, and monument and landscape stability.
7. Some visitor uses are not consistent with the park mission; others are consistent only where made secondary to the primary park mission of interpreting the battle and siege of Vicksburg.
8. Some resources and features are not accessible to visitors or maintenance crews.

Impact Topics

"Impact topics" are a more refined set of concerns derived from the issues. Impact topics are the resources or subjects of concern that could be affected by actions discussed in the range of alternatives. These impact topics were identified from federal laws and regulations, issues that were brought up by the public, and NPS knowledge of scarce or easily affected resources. A brief rationale for the selection of each impact topic is provided below, as well as the rationale for dismissing specific impact topics from further consideration. The impact topics are used to examine the extent to which a resource would be affected by the actions of a particular alternative. The following are the impact topics that are further analyzed in detail in Sections 3 and 4:

Recreational Resources, Aesthetics, and Visitor Experience

Recreational Resources. Recreational land uses associated with the park include walking and biking along the park tour road, and hiking along the park's wooded trail. The proposed alternatives could affect recreational uses in the park.

Visitor Experience. The primary visitor use of Vicksburg NMP is education, museum, and interpretive experiences. Other visitor uses include commemoration, visitor services, and recreation. Vicksburg NMP is frequently used for military training purposes (NPS, 2009). The proposed alternatives are designed to enhance visitor experience.

Aesthetics. Landscape changes would impact the park's aesthetics. Landscape changes that would impact viewscapes may make nearby commercial development visible from the park.

Cultural Resources

Cultural Landscape. A cultural landscape is a geographic area, including both cultural and natural resources and the wildlife and domestic animals therein, associated with a historic event, activity, or person, or exhibiting other cultural or aesthetic values. The proposed alternatives would impact the cultural landscape of Vicksburg NMP to various degrees. Landscape changes could also impact prehistoric and historic archeological resources. Impacts from taking no action and from implementation of a proposed alternative would have the potential to impact the cultural landscape.

Historic Resources. Vicksburg NMP has an extensive collection of historic buildings, structures, and objects. These include hundreds of monuments, cast iron tablets and position markers, bronze castings, over 18,000 headstones in Vicksburg National Cemetery, landscape formations, cannon, bridges, buildings, and the *USS Cairo* gunboat (NPS, 2008a). The proposed cultural landscape treatments could have considerable physical and viewshed impacts on these historic resources.

Archeological Resources. As noted in the park's GMP (1980), archeological sites located at Vicksburg NMP are protected from disturbance (NPS, 1979). A detailed archeological survey of the entire park property has not been conducted. Prehistoric archeological resources were considerably disturbed during the Civil War, and both prehistoric and Civil War archeological resources were considerably disturbed during the CCC era. The proposed cultural landscape treatments could have physical impacts on currently unknown archeological resources.

Natural Resources

Soils and Geologic Hazards. Much of Vicksburg NMP is underlain by loess soils, as shown on the soil survey map of the area from the U.S. Department of Agriculture- (USDA-) NRCS Soil Survey of Warren County, Mississippi (Figure 1-3). The loess soils that are found within the park are fine windblown sediments that become tightly compacted during water percolation. If the soils are left unprotected (*i.e.*, vegetative cover is lost) and exposed to rain and moving water, the soil disintegrates and can have severe slope stability and erosion problems. As early as the 1930s, erosion had become such a problem that CCC established four camps within the park for soil erosion projects. The primary purpose of these projects was to control stormwater runoff and to combat erosion (NPS, 2005). Today, soil erosion threatens military earthworks, archeological resources, and monument and landscape stability. Site topography conditions may be aggravated or exacerbated by the no action and/or action alternatives.

Air Quality and Temperature. NPS strives to perpetuate the best possible air quality because air pollution impacts ecological health, scenic views, human health, and visitor enjoyment even at very low levels (NPS, 2007). Air quality and temperature are a concern at Vicksburg NMP due to the park's proximity to the City of Vicksburg. The proposed cultural landscape treatments could result in vehicle and construction equipment emissions, fugitive dust during land-clearing activities, vegetation removal and the associated possibility of increasing greenhouse gases, and increased gasoline exhaust emissions.

Surface Water Quality and Streamflow Characteristics. Water resources, such as groundwater and surface water, have the potential to be impacted by erosion or runoff under any of the project alternatives. Landscape changes could impact surface water quality, water temperature, and streamflow characteristics. Removal of trees may result in less evapotranspiration and increased streamflow.

Wetlands. Executive Order (EO) 11990 (*Protection of Wetlands*) requires NPS and other federal agencies to evaluate the likely impacts of their actions on wetlands. The objectives of EO 11990 are to avoid, to the extent possible, the long-term and short-term adverse impacts associated with the occupancy, modification, or destruction of wetlands. NPS (2006) *Management Policies* and Director's Order 77-1 (DO-77-1) (*Wetland Protection*) (NPS, 2002) reiterate the importance of safeguarding wetlands. NPS Procedural Manual #77-1 provides agency-specific procedures for complying with the EO. A wetland and stream delineation has been conducted for all of Vicksburg NMP (Figure 1-4). The proposed cultural landscape treatments have the potential to impact wetlands. Alternatives were assessed to determine potential impacts on the natural or beneficial functions of the wetland communities. Per DO-77-1, a Wetland Statement of Findings (SOF) was prepared to determine the potential for adverse impacts on wetlands and to document the anticipated effects.

Vegetation. Vicksburg NMP encompasses one of the few extant tracts of loess bluff hardwood forest on public land in the United States. This loess hill ecosystem borders the eastern edge of the lower Mississippi River Valley from Cairo, Illinois, to Baton Rouge, Louisiana. The loess soils at the western edge of this ecosystem support unique hardwood forests. These forests provide a transition area between the moist bottomland hardwood forests within the Mississippi River floodplain and the more well-drained upland pine forests of the east gulf coastal plain. Loess bluff hardwood forest has become increasingly fragmented by development and other land uses over the years (NPS, 2004). Vicksburg NMP also contains a number of invasive plant species and has instigated programs to control and eradicate some of the invasives. Clearing woodlands and converting them to grassed fields would allow removal of some non-native species, but could also create conditions to promote the spread of non-native species.

Figure 1-3 USDA-NRCS Soil Survey Map

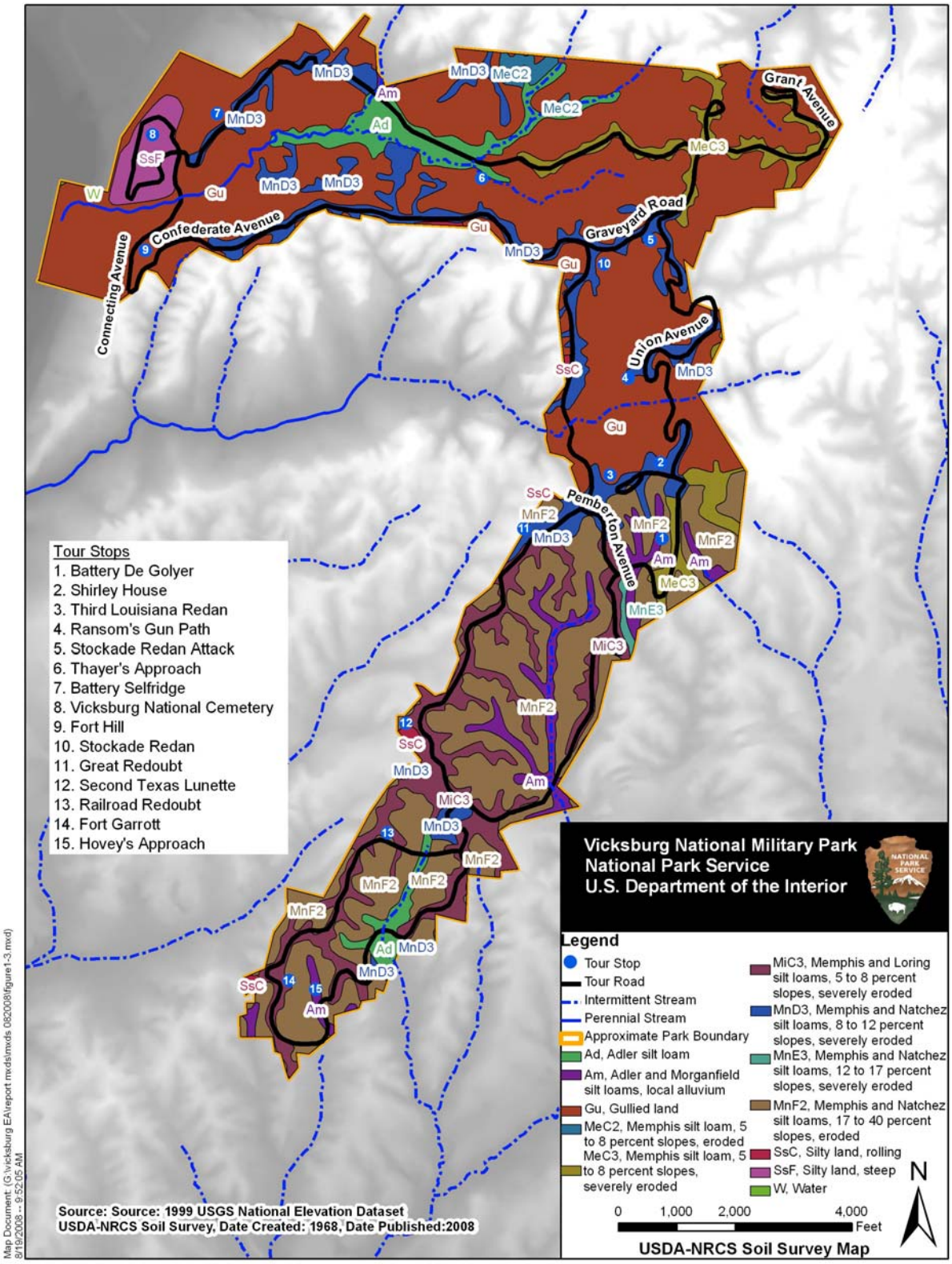
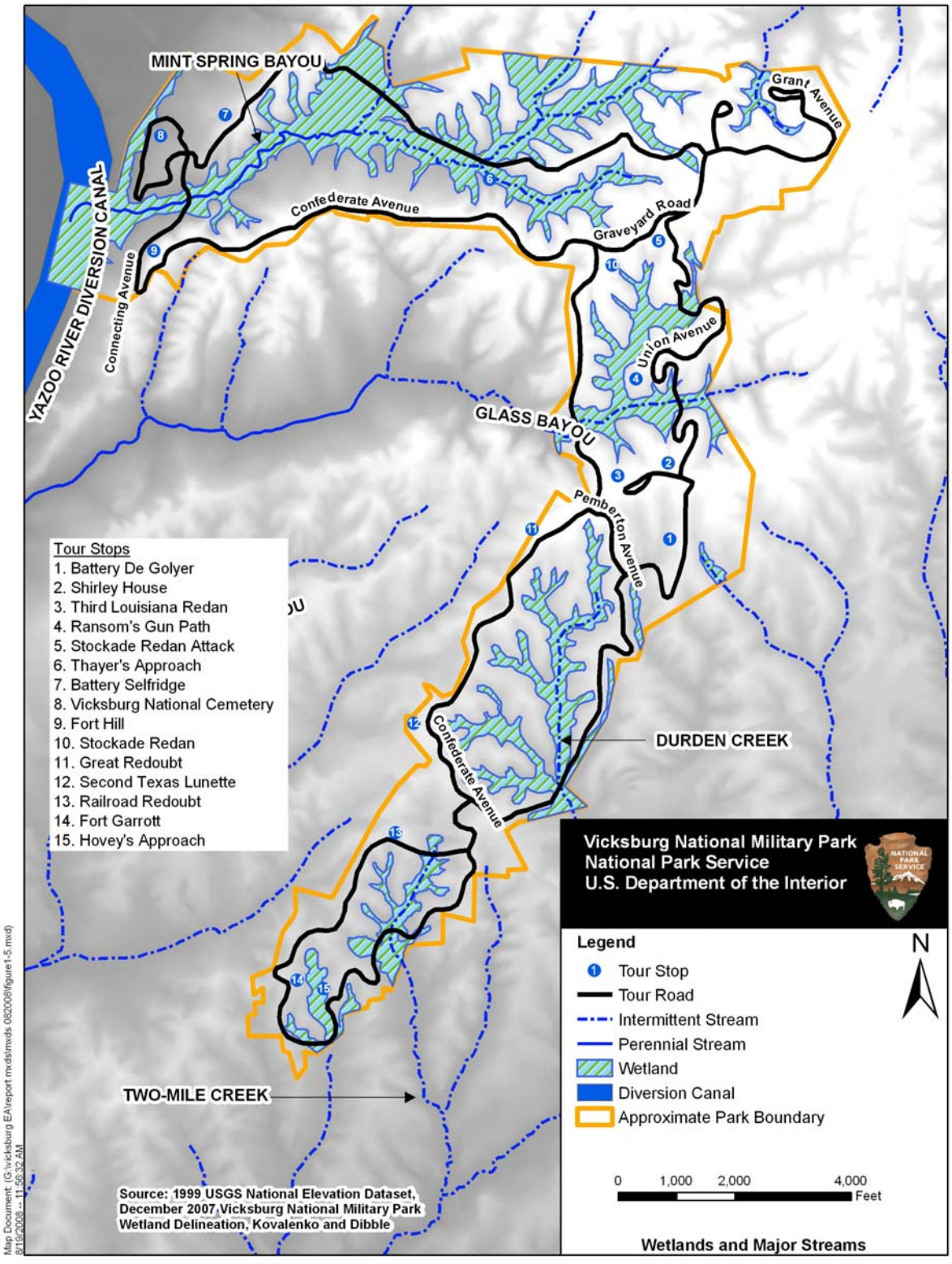


Figure 1-4 Wetlands and Major Streams



Wildlife and Habitat. Various wildlife resources inhabit the mixed hardwood (oak species-dominated), mesophytic forests and grasslands of Vicksburg NMP, which is typical of the southeastern United States. The increase of vegetative cover since the 1930s has encouraged use of the park by many species of native fauna. These include ungulates, small mammals, birds, reptiles, amphibians, and invertebrates. Changes in the amounts and types of vegetative cover could impact wildlife and habitat.

Species of Concern. Because there may be species of concern found in areas included in the proposed cultural landscape treatments, the proposed project could impact species of special concern within the project area.

NPS Operations and Facilities

Long-term Management and Sustainability of Resources. Park staff currently maintain landscape conditions within the project area, and maintenance requirements could be increased based on cultural landscape treatments in the proposed alternatives. Additional security patrol time may be required to prevent vandalism of the physical features and resources of the park as a result of additional interpretive exhibits and creation of new activity areas.

Impact Topics Dismissed from Further Analysis

Several potential impact topics were evaluated and dismissed from further consideration. Potential impact topics dismissed and associated rationale follow:

Ethnographic Resources

Ethnographic resources are defined by NPS as any "site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it (DO-28, Appendix A, page 181). No known ethnographic resources are identified within the Vicksburg NMP area. There are no recognized Native American tribal groups with cultural affiliation to the park.

Marine or Estuarine Resources

No marine or estuarine resources are located near the proposed project. The proposed cultural landscape treatments would not impact any marine or estuarine resources.

Land Use

The proposed cultural landscape treatments would impact up to 350 acres of the approximately 1,800 acres within Vicksburg NMP. The project areas comprise mainly undeveloped land within the park, which is within the corporate limits of Vicksburg, Mississippi. Residences and businesses in the City of Vicksburg would not be impacted by the proposed action. Because the project area is on NPS property and thus is federally owned, there is no local zoning designation for this area. The cultural landscape treatments would be consistent with surrounding zoning and existing land use. The existing land use would not change as a result of the proposed cultural landscape treatments

Unique, Essential, or Important Fish or Fish Habitat

There are no unique, essential, or important fish or fish habitat areas known to be located near the proposed project. The proposed cultural landscape treatments would not impact any unique, essential, or important fish or fish habitats.

Floodplains

EO 11988 (*Floodplain Management*) requires NPS and other federal agencies to evaluate the likely impacts of actions in floodplains. The objective of EO 11988 is to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative. NPS DO-77-2 (*Floodplain Management*) and Procedural Manual #77-2 provide NPS policies and procedures for complying with EO 11988. The proposed project would have no adverse effect on known floodplain areas. The only Federal Emergency Management Agency- (FEMA-) designated floodplains within Vicksburg NMP are in the northwest corner of the park where Mint Spring Bayou enters the Yazoo River Diversion Canal (Figure 1-5).

Soundscapes

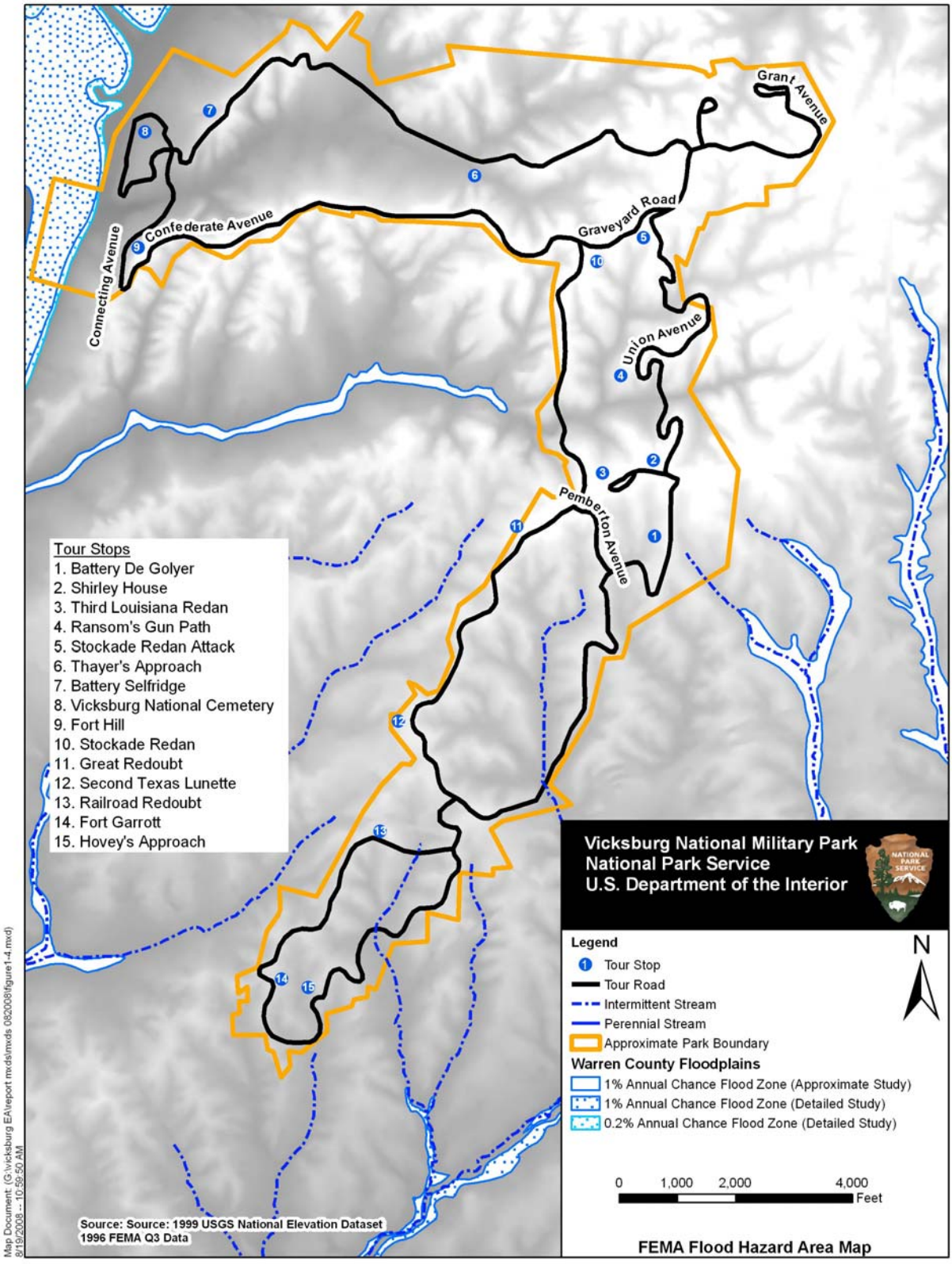
In accordance with the NPS *2006 Management Policies* (NPS, 2006) and DO-47, *Soundscape Preservation and Noise Management* (NPS, 2000), an important objective of the NPS mission is the preservation of natural soundscapes associated with NPS units. Natural soundscapes exist in the absence of human-caused sound. The natural ambient soundscape is the aggregate of all the natural sounds that occur in park units with the physical capacity for transmitting natural sounds. Natural sounds occur within and beyond the range of sounds that humans can perceive, and these sounds can be transmitted through air, water, or solid materials. The frequencies, magnitudes, and duration of human-caused sound considered acceptable vary among NPS units. Acceptance levels of noise for each park unit are generally greater in developed areas and less in undeveloped areas. Based on the park's location within the City of Vicksburg, human-caused sounds at Vicksburg NMP originate from sources within and outside the park. In some areas, vegetative growth along the park boundaries screens outside sounds from the park.

The proposed cultural landscape treatments would not increase noise levels. Land-clearing activities would have short-term, adverse impacts on noise levels. The impact would be negligible because noise generated from land-clearing activities is not anticipated to disrupt visitor activities. The land-clearing contractor would be required to comply with local noise ordinances. The proposed actions would not result in an increase in noise levels in or near the project area, and only negligible, short-term, adverse impacts on noise levels during land-clearing activities would occur.

Energy Resources

Implementation of the proposed cultural landscape treatments represents a considerable one-time expenditure of energy resources both in the fabrication of construction materials and in the actual land-clearing process, generally the consumption of crude oil resources. After land clearing, maintaining additional landscape areas would require additional energy consumption and costs than would the current condition or the no action alternative. The cleared landscapes would be managed to reduce maintenance requirements by incorporating appropriate vegetation, and the areas would be mowed only seasonally. Therefore, the additional energy consumption would be minimal when compared to the overall energy use of the park.

Figure 1-5 FEMA Flood Hazard Area Map



Another factor given consideration would be the possibility of making sources of raw materials for energy production unavailable due to project implementation. The proposed cultural landscape treatments would not prevent access to any known energy resources in the project vicinity, such as coal, oil, or natural gas. The project would have no such impacts on the availability of these resources.

Socioeconomics

Education, health, social services, manufacturing, the arts, entertainment, recreation, accommodation, and food services are the primary industries in Warren County (U.S. Census, 2000). Vicksburg NMP is also an economic contributor, as it received approximately 699,314 visitors in 2007 (NPS, 2008a).

There could be minimal additional employment at Vicksburg NMP as a result of the proposed projects because of increased maintenance, interpretation, and security concerns. Minimal employment opportunities and some related revenues for construction materials are anticipated for this project. The proposed project would contribute to a beneficial impact of the economy as a result of improved park access, tourism, and safety. However, these socioeconomic impacts would be negligible with a long-term, beneficial impact on the local economy of the surrounding area.

Minority and Low-income Populations

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations*, requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental impacts of their programs and policies on minorities and low-income populations and communities.

For the purpose of fulfilling EO 12898 in the context of NEPA, the alternatives addressed in this EA were assessed during the planning process. Although there are minority and/or low-income populations and communities within the county and region, it was determined that none of the planning alternatives would result in disproportionately high direct or indirect adverse impacts on these groups. The following information contributed to this conclusion:

- The actions proposed by the alternatives would not result in any identifiable human health impacts. Therefore, there would be no direct or indirect adverse impacts on human health within any minority or low-income population or community.
- The impacts on the natural and physical environment that would occur due to any of the alternatives would not disproportionately or adversely impact any minority or low-income population or community.
- The planning team actively solicited public participation as part of the planning process and gave equal consideration to all input from persons regardless of age, race, income status, or other socioeconomic or demographic factors.
- Impacts on the socioeconomic environment resulting from any of the action alternatives would be negligible. Additionally, any impacts on the socioeconomic environment would not substantially alter the physical and social structure of nearby communities.

Museum Collections

Currently, the museum collection of Vicksburg NMP comprises over 297,465 items (NPS, 2005). These items are on display at the *USS Cairo* Museum and at the park's Visitor Center. The entire collection

comprises two distinct collections. The first includes items directly from the battlefield, such as original letters; diaries; books; clothing; and the accouterments donated by soldiers, civilians, and their descendants. The second contains items recovered during the salvage of the *USS Cairo* gunboat, a powerful Union ironclad that served in the lower Mississippi River basin. The proposed project would not impact the current museum collection. Any artifacts recovered during land-clearing activities would be preserved according to NPS standards as described in DO-24, *Museum Collections Management*.

GUIDING LAWS, REGULATIONS, AND POLICIES

This EA was prepared in compliance with all applicable federal, state, and local laws, regulations, and policies to the alternatives described in Sections 2 through 4. The following is a list and brief description of federal, state, and local regulations considered.

Vicksburg NMP Enabling Legislation

Vicksburg NMP was established on February 21, 1899, via an act of Congress (30 Stat. 841):

> *An Act to establish a national military park to commemorate the campaign, siege, and defense of Vicksburg, approved February 21, 1899 (30 Stat. 841)*
>
> *Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,*
>
> *NATIONAL MILITARY PARK, VICKSBURG, MISS., established.*
>
> *That in order to commemorate the campaign and siege and defense of Vicksburg, and to preserve the history of the battles and operations of the siege and defense on the ground where they were fought and were carried on, the battlefield of Vicksburg, in the State of Mississippi, is hereby declared to be a national military park whenever the title to the same shall have been acquired by the United States and the usual jurisdiction over the lands and roads of the same shall have been granted to the United States by the State of Mississippi …*

The Public Law (PL) that created the park set forth specific goals and objectives relating to maintenance of the historic landscape, as evidenced by the following language contained in the legislation: "… to enable the Secretary of War to begin to carry out the purpose of this Act, including … restoring the field to its condition at the time of the battle, …" and "That it shall be the duty of the commissioners … to restore the forts and the lines of fortification, the parallels and the approaches of the two armies, or so much thereof as may be necessary to the purposes of this park; …".

NPS Organic Act and Amendments (16 U.S. Code [USC] 1-4)

By enacting the NPS Organic Act of 1916, Congress directed the U.S. Department of the Interior and NPS to promote and regulate park units "to conserve the scenery and the natural and historic objects and wild life therein and to provide for the enjoyment of the same in such a manner and by such a means as will leave them unimpaired for the enjoyment of future generations" (16 USC 1). The Redwood National Park Expansion Act of 1978 reiterates this mandate by stating that NPS must conduct its actions in a manner that will ensure no "derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress" (16 USC 1a-1). Congress further authorized the Secretary of the Interior to "make and publish such rules and regulations as he may deem necessary or proper for the use of the parks …" (16 USC 3).

The Organic Act and its amendments afford NPS latitude when making resource decisions. Because conservation remains predominant, NPS seeks to avoid or to minimize adverse impacts on park resources and values. While some actions and activities can cause impacts, the Organic Act prohibits actions that impair park resources unless a law directly and specifically allows for such actions (16 USC 1a-1). An action constitutes an impairment when its impacts "harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values" (*NPS Management Policies 2006*, Section 1.4.4) (NPS, 2006). To determine impairment, NPS must evaluate "the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts" (*NPS Management Policies 2006*, Section 1.4.4) (NPS, 2006).

Because park units vary based on enabling legislation, natural resources, cultural resources, and missions, management activities appropriate for each unit and for areas within each unit vary as well. An action appropriate in one unit could impair resources in another unit. Thus, this EA analyzes the context, duration, and intensity of impacts related to implementation of the CLR recommendations within Vicksburg NMP, as well as the potential for resource impairment, as required by DO-12 (NPS, 2001).

NPS Management Policies 2006

NPS Management Policies 2006 (NPS, 2006) provides the overall foundation, sets the framework, and provides direction for management decisions within NPS. Management policies cover park system planning, land protection, natural resource management, cultural resource management, wilderness preservation and management, interpretation and education, use of the parks, park facilities, and commercial visitor services. The NPS cultural resource management program involves research to identify, evaluate, document, register, and establish basic information regarding cultural resources and traditionally associated peoples; planning to ensure that management processes for making decisions and setting priorities integrate information regarding cultural resources and provide for consultation and collaboration with outside entities; and stewardship to ensure that cultural resources are preserved and protected, receive appropriate treatments (including maintenance) to achieve desired conditions, and are made available for public understanding and enjoyment (NPS, 2006). Adherence to NPS policy is mandatory, unless specifically waived or modified by the Secretary of the Interior, the Assistant Secretary of the Interior, or the Director of NPS.

NEPA of 1969, as Amended (PL 91-190, 42 USC 4321-4347, January 1, 1970, as amended by PL 94-52, July 3, 1975; PL 94-83, August 9, 1975; and PL 97-258, §4(b), September 13, 1982)

NEPA requires that federal agencies conduct an environmental impact analysis before taking an action that has the potential to significantly impact the human environment. The environmental planning process must use site-specific data, consider interdisciplinary aspects of the project, consider reasonable alternatives, and involve the public, among other requirements.

Council on Environmental Quality (CEQ) (40 Code of Federal Regulations [CFR] 1500-1508)

NEPA is implemented through regulations of CEQ. CEQ published NEPA regulations in 1978 and added to them in 1981 with a guidance document titled *Forty Most Asked Questions Concerning CEQ NEPA Regulations* (NPS, 2001). CEQ requires each federal agency to implement procedures to make the NEPA process more useful to agency decision-makers and the public (40 CFR 1500.2 as cited in NPS, 2001). CEQ includes regulations and guidance on proper planning and timing, document preparation and commenting, decision-making, and public involvement.

DO-12: Conservation, Planning, Environmental Impact Analysis, and Decision-making

NPS DO-12 and its accompanying handbook (NPS, 2001) lay the groundwork for how NPS complies with NEPA and CEQ regulations. DO-12 sets forth a planning process for incorporating scientific and technical information and for establishing an Administrative Record for NPS projects. DO-12 requires that impacts on park resources be analyzed in terms of their context, duration, and intensity. It is crucial for the public and decision-makers to understand the implications of those impacts in the short and long term, cumulatively, and within context, based on an understanding and interpretation by resource professionals and specialists. DO-12 also requires that an analysis of impairment to park resources and values be made as part of the NEPA document.

DO-77-1: Wetland Protection

EO 11990 (*Protection of Wetlands*) requires NPS and other federal agencies to evaluate the likely impacts of their actions on wetlands. The objectives of the EO are to avoid, to the extent possible, the long-term and short-term adverse impacts associated with the occupancy, modification, or destruction of wetlands. NPS (2006) *Management Policies* and DO-77-1 (*Wetland Protection*) (NPS, 2002) reiterate the importance of safeguarding wetlands. NPS Procedural Manual #77-1 provides agency-specific procedures for complying with the EO. Per DO-77-1, a Wetland SOF was prepared to determine the potential for adverse impacts on wetlands and to document the anticipated effects.

DO-77-2: Floodplain Management

EO 11988 (*Floodplain Management*) requires NPS and other federal agencies to evaluate the likely impacts of actions in floodplains. The objective of EO 11988 is to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative. NPS DO-77-2 (*Floodplain Management*) and Procedural Manual #77-2 provide NPS policies and procedures for complying with EO 11988.

Clean Water Act (CWA)

Jurisdictional waters of the United States, including streams and wetlands, are defined by 33 CFR 328.3 and are protected by Section 404 of the CWA (33 USC 1344). Impacts on these regulated resources are administered and enforced by USACE.

For the purposes of implementing DO-12, areas that are classified as a wetland habitat according to the USFWS *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin *et al.*, 1979) are subject to the implementation procedures outlined in *Procedural Manual #77-1: Wetland Protection*.

Endangered Species Act (ESA)

Plants and animals listed as federally threatened and endangered are protected under the ESA, PL 92-205, which is administered and enforced by USFWS. If a federal permit is required from USACE, consultation between USACE and USFWS is required under Section 7 of the ESA, 16 USC 1531-1534, for proposed projects that "may affect" federally endangered and threatened species.

Clean Air Act (CAA)

The CAA and subsequent amendments have established procedures for improving conditions, including a set of National Ambient Air Quality Standards (NAAQS). In 1997, the U.S. Environmental Protection Agency (USEPA) established the 8-hour ground-level ozone standard at 0.08 part per million (ppm). Under this standard, USEPA can designate an area as "nonattainment" if it has violated the 8-hour ozone standard. USEPA may also designate an area as "attainment/unclassifiable," which is an area where monitored air quality data show either that the area has not violated the ozone standard over a three-year period or that there is not enough information to determine the air quality in the area. The entire state of Mississippi is designated as an attainment area (USEPA, 2008a).

National Historic Preservation Act (NHPA)

The primary Act related to cultural resources is the NHPA of 1966, as amended (16 USC 470 *et seq*.). Section 106 of this Act requires federal agencies to consider the effects of their undertakings on properties listed or potentially eligible for listing on the National Register of Historic Places (NRHP).

State of Mississippi

The Air Division of MDEQ is charged with controlling, preventing, and abating air pollution to achieve compliance with air emission regulations pursuant to the Mississippi Air and Water Pollution Control Act. All air permitting other than that for acid rain is administered in the MDEQ Environmental Permits Division. MDEQ does not issue open-burning permits, but specific standards for open burning are set forth in Section 3.7 of Regulation APC-S-1. These standards must be followed.

To discharge stormwater from a construction site, all construction projects that disturb 1 acre or more must have either an individual stormwater permit or coverage under one of Mississippi's general permits. "Disturbance" includes, but is not limited to, soil disturbance, clearing, grading, and excavation. Operators of sites disturbing less than 1 acre are also required to obtain a permit if their activity is part of a "larger common plan of development or sale" with a planned disturbance of 1 acre or greater. A Stormwater Pollution Prevention Plan (SWPPP) would be required to be developed for the stormwater permit.

MDEQ administers the 401 Water Quality Certification Program, the focus of wetland regulation and protection programs at the state level. MDEQ evaluates proposals for their impact on wetlands. MDEQ may waive, issue with conditions, or deny a 401 certification. The federal 404 permit from USACE is not issued until MDEQ issues a 401 certification. The application prepared for USACE also serves as an application for water quality certification.

City of Vicksburg and Warren County

Vicksburg NMP falls under the land use category of public and semi-public land (City of Vicksburg, 1996). The City of Vicksburg recognizes Vicksburg NMP as federal land that is exempt from zoning (City of Vicksburg, 2008a). Because Vicksburg NMP is exempt from zoning, the City of Vicksburg building regulations do not apply at Vicksburg NMP (City of Vicksburg, 2008b). There are no known Warren County, Mississippi, land use regulations applicable to the operations at Vicksburg NMP.

Controlled burns for vegetation management at Vicksburg NMP must be issued a burn permit by the Mississippi Forestry Commission Office. A Vicksburg NMP representative must notify the Vicksburg Fire Department and local law enforcement agencies when burning is planned. A Vicksburg NMP

representative must coordinate with the Vicksburg Fire Department when burning is planned. The Vicksburg Fire Department would approve the burning activity if weather conditions are favorable.

2. ALTERNATIVES, INCLUDING THE PREFERRED ALTERNATIVE

2. ALTERNATIVES, INCLUDING THE PREFERRED ALTERNATIVE

INTRODUCTION

Draft alternatives were developed during a November 2007 workshop with the project team. A full range of alternatives was developed, meeting the park's purpose and objectives for taking action and meeting NPS guidelines for providing different means of accomplishing park goals while protecting and/or minimizing impacts on some or all resources. Furthermore, the draft alternatives are consistent with applicable laws, policies, and regulations that guide NPS, as summarized in Section 1. The alternatives under consideration are listed below:

- Alternative A – Continue Existing Management (No Action)
- Alternative B – Preservation Through Best Management Practices (BMPs)
- Alternative C – Rehabilitate/Maintain Key Areas of Military Engagement
- Alternative D – Rehabilitate/Maintain the Broad Spectrum of Military Engagements

Two additional alternatives were considered but dismissed because they were determined to be not practical. Alternatives that were considered but dismissed are briefly discussed at the end of this section.

For the purposes of the EA, the following terms are used based on the meaning conveyed in *The Secretary of the Interior's Standards for the Treatment of Historic Properties: with Guidelines for the Treatment of Cultural Landscapes* (1996), as follows.

"Preservation" is the act or process of applying measures necessary to sustain the existing form, integrity, and materials of a historic property. Work, including preliminary measures to protect and stabilize the property, generally focuses upon the ongoing maintenance and repair of historic materials and features rather than extensive replacement and new construction. New additions are not within the scope of this treatment; however, the limited and sensitive upgrading of mechanical, electrical, and plumbing systems and other code-required work to make properties functional are appropriate within a preservation project.

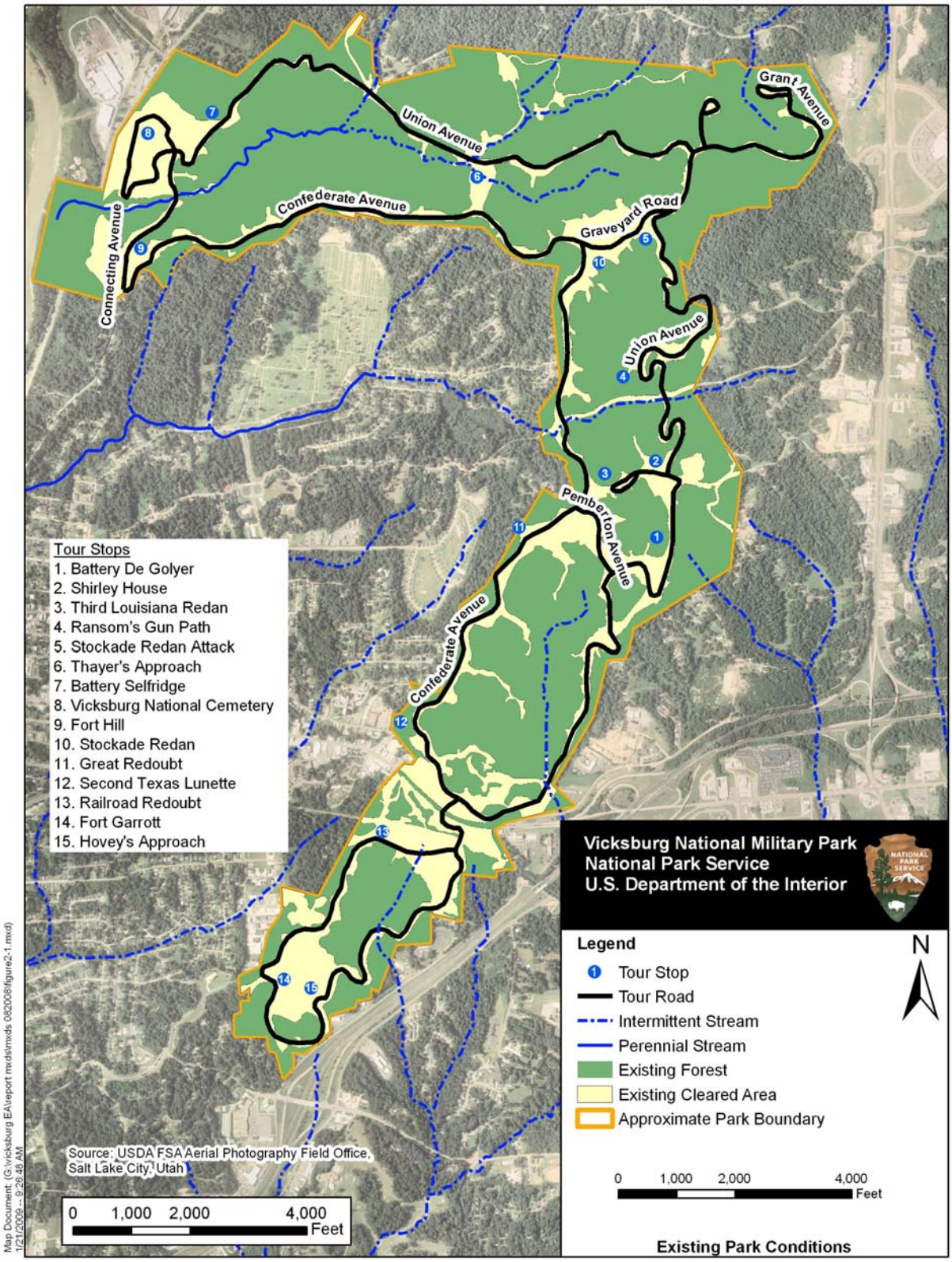
"Rehabilitation" is the act or process of making possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features that convey its historical, cultural, or architectural values.

"Restoration" is the act or process of accurately depicting the form, features, and character of a property as it appeared at a particular period of time by removing features from other periods in its history and reconstructing missing features from the restoration period. The limited and sensitive upgrading of mechanical, electrical, and plumbing systems and other code-required work to make properties functional are appropriate within a restoration project.

ALTERNATIVE A – CONTINUE EXISTING MANAGEMENT (NO ACTION)

As part of this alternative, the park would maintain its current landscape patterns and features and the management and maintenance practices that sustain them. Figure 2-1 presents the existing park conditions, including the currently forested and cleared areas of the park. The existing Visitor Center would continue to serve as the primary means for visitor contact and orientation. The 16-mile tour road would remain the primary vehicular access route for experiencing the park's resources, and it would retain its current configuration and circulation pattern. Visitors would continue to explore the park

Figure 2-1 Existing Park Conditions



outside their vehicles at established points of interest, such as the Shirley House and Illinois State Memorial. No further clearing would be undertaken, and current mowing and vegetation management regimens would be continued, including specific protocols for the treatment of areas infested with invasive plants (such as kudzu) and repressing succession with prescribed fire. Important views that are already maintained as significant interpretive sites, such as Thayer's Approach, would continue to be managed for clear sight lines. Treatment would also focus on stabilization and maintenance of the current landscape and preservation of the park's Civil War and commemorative features as they exist today, including earthworks, associated cannon, and monuments. Because this alternative comprises existing management practices, detailed information regarding the periodic efforts conducted to maintain the park is described below within each landscape management area:

"Unmaintained" landscape areas. Areas of the landscape that are not mowed.

- Oversee right-of-way maintenance and activity.
- Monitor wildlife, habitat, erosion, vital signs, and invasive species.

"Maintained" landscape areas. Areas of the landscape that are mowed at varying intervals.

Activities conducted throughout the area:

- Monitor and inspect for hazardous trees and erosion.
- Correct erosion as needed.
- Remove hazardous trees as needed.
- Monitor wildlife, habitat, erosion, vital signs, and invasive species.
- Monitor, mark, and maintain a cleared zone and fire break, approximately 10 feet wide, along the boundary.
- Clean and maintain features (monuments, cannon and carriages, markers, tablets, statues, busts, and reliefs).
- Patrol and monitor for vandalism prevention and law enforcement.

Activities conducted at "points of interest" (places where visitors are invited to leave their vehicles, such as the Shirley House and tour road stops):

- Remove trash daily.
- Mow biweekly, except for the Shirley House, Visitor Center, *USS Cairo* Museum, and fee collection and information kiosks, which are mowed weekly.
- Trim around features biweekly.
- Treat fire ant mounds weekly.
- Update kiosk information quarterly.
- Trim overgrowth annually.
- Limb up trees where they interfere with important views annually.
- Maintain/replace signs annually.
- Maintain waysides and interpretive panels annually.

Activities conducted in association with the 16-mile tour road and other roads, parking areas, and bridges:

- Remove trash daily.
- Blow off debris two times per week.
- Patch potholes two times per year.
- Grade gravel surfaces monthly.

- Maintain gates monthly.
- Repair curbing annually.
- Remove vegetation from bridges annually.
- Maintain/replace signs annually.
- Seal cracks every five years.
- Stripe every five years.
- Seal bridges every five years.
- Maintain fee collection and information kiosks every five years.
- Correct erosion as needed.

Activities conducted within the "general landscape" (areas that are visible from the tour road and points of interest, and the administrative/maintenance/collections storage area):

- Remove trash daily.
- Trim around features biweekly.
- Mow every three weeks.
- Treat vegetation behind the *USS Cairo* Restoration Shop to keep the drain open two times per year.
- Trim overgrowth annually.
- Limb up trees to provide visual access and to allow equipment and visitor access annually.

Activities conducted in "backfields areas" (opening up vegetation and maintaining vegetative cover for important views):

- Bush hog/mow as possible three times per year.
- Trim overgrowth to permit access for maintenance every three to five years.
- Cut and treat woody vegetation in ravines and steep slope conditions every five years; leave the timber in place.

Areas with unique management considerations:

- Kudzu management area. Treat kudzu two times per year; otherwise, treat as unmaintained landscape area.
- Railroad Redoubt riparian buffer (25 feet on each side of the stream, 50 feet total). Maintain vegetation height to less than 20 feet; otherwise, treat as backfields area.
- Trails (12 miles unpaved). Initiate volunteer projects to clear trails annually; otherwise, treat as unmaintained landscape.
- Burn units (six units totaling 60 acres).
  - Burn every two years.
  - Cut big wood (8 inches in diameter and smaller) two months before scheduled burn.

Implications of the Alternative. Relationship of the alternative to the issues common to all:

- Under this alternative, no additional tree clearing would be undertaken at the park.
- Turf grass would continue to be the preferred landcover type along visitor road corridors and associated with earthworks and monuments that fall within the maintained areas of the park. There would continue to be some monuments and tablets that are located outside maintained areas that may not be visually accessible because of tree cover and steep slopes.
- Existing interpretive programs would continue.

- The park may not be able to address the concerns raised in the Purpose, Need, Objectives, and Concerns statement prepared to guide the EA project and presented above, including the following:

  - Additional measures are needed to enhance interpretation of Union and Confederate military objectives during the siege of Vicksburg to comply with the park's enabling legislation.
  - Visitors appreciate the natural landscape. However, visual interpretation and understanding of the military objectives are difficult because the current landscape obscures lines of sight to battlefield features.
  - Visitors generally do not experience park resources up close.
  - Soil erosion threatens military earthworks, archeological resources, and monument and landscape stability.
  - Some resources and features are not accessible to visitors or maintenance crews.

ALTERNATIVE B – PRESERVATION THROUGH BEST MANAGEMENT PRACTICES (BMPS)

This alternative involves identifying management practices for the landscape that best support preservation of vestiges of the Civil War siege as they exist today. The BMPs support soil conservation throughout the park, but particular emphasis would be placed on retaining surviving aboveground evidence of the earthworks constructed by the opposing armies, and any surviving below-ground archeological evidence of the siege. BMPs would consider the role of vegetative cover in conserving soil; the ecological implications of maintaining healthy plant communities, including the associated need for water resource protection; and diversity of quality wildlife habitat. A list of BMPs to be considered is included as Appendix B.

Erosion control has been a management challenge at the park since its inception because of the fragility of the underlying loess soils. Disturbed areas begin to erode immediately unless stabilized under protective cover, such as vegetation with a fibrous root system. Severe erosion due to early 20th century agriculture was corrected in the 1930s by the CCC through extensive regrading, filling, and slope stabilization, including tree planting and sodding. This alternative advocates a proactive approach to soil erosion control and continued vigilance in taking corrective measures where necessary to ensure that erosion does not jeopardize existing landforms.

As part of this alternative, the park would investigate the range of landcover types available that best protect the loess soil from erosion. Using the best scientific and empirical information available, the park would convert existing plant communities that do not provide adequate protection from erosion over time to new landcover that better mitigates the potential for erosion. New landcover would comprise plant communities tailored to site-specific conditions, including soil moisture and slope and solar orientation. Landcover might include a combination of continued use of turf grasses and new warm season grass and forb fields, savanna (a combination of grasses and widely spaced hardwood trees), wet meadows, or mesophytic forest. The principal characteristic of this alternative is that management of the landscape would follow the most effective and practical erosion control methods available, based on available scientific and empirical knowledge and finances, in an effort to preserve Civil War-era resources. One initial focus would be on removing invasive plant species, such as kudzu and privet, which crowd out native species, with better soil holding ability.

Because the resulting landcover might alter visual and/or physical accessibility of the landscape resources used to interpret the park to the public, future interpretation of the Civil War landscape might feature advanced technology and media to illustrate conditions of the Civil War landscape that cannot be otherwise explained on the ground. New digital technologies are beginning to provide unprecedented opportunities for visual and auditory interpretive material. The battle could be interpreted and visualized

on-site in such a way that the visitor would be able to mediate any differences between the landscape of today and that present at the time of the siege. Such tools could facilitate interpretation without having to faithfully recreate or represent historic conditions. Various interpretive means ranging from static exhibits, models, and waysides to dynamic and interactive displays on indoor and outdoor digital screens, or audiovisual presentations downloadable and transportable on handheld devices, such as personal cell phones or Global Positioning System (GPS) rangers, could be used to bridge the gap. Exhibits and other interpretive aids could feature representations of missing Civil War resources such as wooden platforms, headwalls, log and stone cribs, internal circulation, magazines and bombproofs, lookout towers, soldier tents, barracks, mess halls, and shebangs that constituted the elements of the fortifications and the life of the soldiers stationed there. Interpretive aids might also depict the cane brakes, cabled brush, chevaux-de-frise, and abatis that reinforced the Confederate line of defenses faced by approaching Union soldiers, or outline important sites or trajectories using mowing patterns or other minimal and removable interventions. Finally, interpretive aids might also be used to tell the story of life in the region by depicting one of the farmsteads that sat on one of the ridges as the siege began, or the cave dwellings constructed by civilians during the siege. These aids would be designed solely to enhance on-site interpretation, and would be temporary and removable so as not to permanently alter the cultural landscape. In addition, they would be conceived as interpretive aids, not as reconstructions, and sited in such a way as to educate visitors without suggesting that they are themselves historic resources.

Assumptions.

- The goal of this alternative is to preserve the landscape as it exists as far as landform and topography are concerned. Preservation is a relatively restrictive treatment approach, which assumes that existing features are replaced in kind, and new features are not added to the landscape. These restrictions may be problematic if interpretive exhibits are proposed for areas of the park other than visitor use zones, such as the Visitor Center environs.

- Soil erosion control as it relates to cultural resources and their connection to the natural terrain is the primary objective of this alternative.

- This alternative is based on the assumption that BMPs are constantly updated based on available scientific data and site manager feedback regarding performance data.

- This alternative assumes a gradual implementation process and an adaptive management strategy. The approach is intended to be conservative and aimed primarily at the protection of sensitive resources.

Implications of the Alternative. The following section indicates the relationship of the alternative to the issues common to all:

- How much, if any, tree clearing would occur under this alternative is unclear.

- To supplement any potential lack of visual accessibility to the battlefield landscape, an innovative and creative approach to interpretation is an integral part of this alternative.

- Relic hunting may or may not be affected by the implementation of this strategy, depending on the future landcover type established.

- Given all of the unknowns associated with this alternative, identifying the implementation costs would rely on the establishment of numerous assumptions.

Other Implications and Considerations.

- This alternative, if successfully implemented, would provide the best protection for the resources that serve as a physical connection between the siege of Vicksburg and current and future generations.

- This strategy appears to best meet the 1916 NPS Organic Act mandate that all parks are subject to conserving "the scenery and the natural and historic objects and the wild life therein," and providing "for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

- This alternative may facilitate management and maintenance practices, but it also may take years or decades to implement. Implementation may present challenges that cannot currently be met by the park, depending on the BMPs that are adopted and landcover types recommended for soil conservation.

- There are conflicting opinions in the scientific community regarding what landcover type(s) and communities best protect loess soil from erosion. A clear and undisputed compendium of BMPs for the site may not be fully developed for some time.

- A protocol for monitoring the efficacy of any treatment approach implemented would need to be developed. Adjustments would need to be made to the approaches to address any problems identified through the adaptive management strategy.

- Annual investigation into the available alternatives for protecting loess soil from erosion through landcover management may be needed to continually apply BMPs to preserving the park's significant Civil War resources.

- In the absence of an alternative strategy and defined BMPs, every effort would need to be made to stabilize areas currently undergoing erosion by utilizing the most effective short- and long-term means for arresting the process and correcting the cause of the erosion. Methods might include placing leaf litter, straw, stone, seeded mats, excelsior netting, or geotextile over exposed soil while establishing new vegetative cover. Methods for establishing new vegetation communities might range from seeding or hydroseeding to sodding. Diverting overland flow of stormwater from areas undergoing erosion without causing erosion elsewhere may also be required.

- The park's current approach to landcover management is based on what currently works given the benefit of past experience. The park's maintenance capabilities are a critical factor in landcover management at the park. If the staff is insufficient to maintain grass cover through regular periodic mowing, or mowing is not feasible given the park's steep slopes, then trees are the next best option given the park's current capabilities. Tree canopies reduce the erosive energy of rain, and their root systems can slow erosion, which is why CCC originally planted trees. If other grass species and grass and forb communities that can be appropriately maintained are identified, it would be of great value to the park. Terracing and directing water not to flow across sloped surfaces are also necessary to prevent erosion. CCC installed extensive guttering to control the flow of surface water across slopes. Fort Hill, for example, is terraced. The efficacy of this system needs to be evaluated as part of the development of appropriate strategies for managing erosion as part of this alternative.

- The engineering of stormwater and surface water management through extensive manipulation of existing topography, such as terracing and guttering, would not necessarily be consistent with a preservation approach but may be necessary to succeed.

- Bermuda grass has a root system that holds loess soil well. Fort Hill has been colonized by Johnson grass, an invasive alien plant, which provides very little soil protection.

- Resources leading to erosion may need to be removed to support the efficacy of this strategy. For example, the historic tour roads may exacerbate soil erosion problems, suggesting their removal or redesign.

- Under this alternative, one resource may need to be altered to preserve another.

- Conflicts between historic resources associated with the primary period significance and other resources could be addressed through interpretation.

- Interpretation, including Living History, can take the place of making physical changes to the landscape to meet the objectives of the enabling legislation.

- Interpretation could incorporate both traditional modes and newer technologies.

- While primary interpretation would take place at the Visitor Center and the *USS Cairo* Museum, and through rangers, volunteer guides, podcasts, GPS, and cell phone tours, the park could also continue to explore innovative technologies to interpret Civil War events and associations as they evolve.

Treatment Recommendations and Implementation Guidelines. The bullet points that follow outline the actions that taken together constitute this treatment alternative:

- Convene local experts knowledgeable in land and soil management from groups such as the Nature Conservancy, the Mississippi Natural Resources Conservation Service, the Conservation Reserve Program, Mississippi Wildlife Fisheries and Parks, Mississippi State University, USGS, and the County Agricultural Extension Agency, to identify the range of possible landcover types that should be considered for soil erosion control within the park landscape, and their associated advantages and disadvantages. Vegetation communities that might be considered include warm season grass fields; grass and forb meadow or prairie; oak savanna; native oak-hickory woodland representative of presettlement communities; and cool season turf grass such as Bermuda, Bahia, centipede, and St. Augustine. Involve the group in developing an initial set of BMPs for the establishment and maintenance of each recommended landcover type.

- Evaluate the advantages and disadvantages of the landcover types discussed by the group of local experts, and identify recommended landcover types to be established within different areas of the park. Evaluations would be conducted by park and regional NPS personnel, including, but not limited to, a natural resource specialist, archeologist, historical landscape architect, and maintenance manager.

- Identify three 10-acre sites to be converted to a new landcover type based on the recommendations of the group of local experts. Sites would be at risk because they are currently undergoing erosion, are deteriorating because current maintenance or management practices are not successfully mitigating erosion, or are threatened with colonization by invasive species.

Consider three 10-acre sites currently involved in kudzu management as the first conversion candidates.

- Install the new landcover type(s) utilizing the BMPs identified for the site during previous planning efforts.

- Assume maintenance procedures would include weekly mowing of one-third of the new landcover, biannual mowing of one-third of the new landcover, and biannual early spring burning of one-third of the new landcover.

- Initiate monthly monitoring procedures to evaluate the efficacy of the new landcover.

- Evaluate annually the success of the converted units, and revise implementation strategies and BMPs accordingly. Document all findings, decisions, and updates to management protocols as part of this adaptive strategy.

- Initiate conversion of additional units after monitoring the results of previously established areas for three years and applying the results of the endeavor to the methods utilized in converting the next unit. For the purposes of this study, convert three 10-acre units per three-year period.

- Expand the park's invasive alien plant species control programs by doubling current efforts to dissuade colonization by invasive species and encouraging the establishment of healthy native species. Include South Fort in the control program.

- Control or eradicate the privet along the park boundary and where it has spread. Replace privet with native trees and shrubs along the park perimeter to form a 50- to 100-foot-wide screen planting.

- Develop interpretive programs that utilize digital technology to allow visitors to understand and visualize the battlefield landscape where it is obscured by vegetative cover that protects the soil from erosion. These might include access to audiovisual and multimedia recordings as well as interactive digital information such as historic maps georeferenced to current conditions using a Geographic Information System, via mobile devices such as cell phones, GPS rangers, MP3 players, or car stereos, and displays such as outdoor or indoor digital screens, or LCD or plasma touch screen kiosks.

- Develop a large-scale relief model of the battlefield landscape as it existed during the siege that can be experienced spatially and/or tactilely by visitors.

- Improve the Living History area near the Visitor Center. Provide additional universally accessible opportunities to engage in demonstrations, and enhance visitor comfort by providing three additional benches and shade trees in locations that have a good view of the activities.

- Develop five new removable exhibits at various locations around the park. These exhibits would feature aspects of soldier life during the siege, a field hospital, the military engineering of the earthworks, weaponry used by the opposing armies and aspects of its use including fields of fire, and examples of obstacles placed by the military to deter attack on their fortifications as well as approach trenches and associated features used to attack fortified positions.

- Provide enhanced interpretation of the Civil War-era Shirley House landscape using a removable outdoor exhibit.

- Establish new interpretive information in association with the three riverfront park units to offset any changes that might occur to views and access should vegetation be rehabilitated to protect against erosion.

- Provide an interpretive wayside in a location where forest established by CCC survives. Convey information regarding the 1930s efforts to stabilize slopes and mitigate soil erosion within the park, including the planting of trees, grading, and rehabilitation of some road segments and monuments.

- Increase signage along the park boundary that identifies the penalties associated with relic hunting.

- Provide as many as 10 additional benches with associated shade trees near parking pull-offs and places where visitors are encouraged to get out of their cars.

ALTERNATIVE C – REHABILITATE/MAINTAIN KEY AREAS OF MILITARY ENGAGEMENT

This alternative focuses on rehabilitating Vicksburg NMP by making landcover changes that reveal the historic landscape of the Civil War siege in areas of key military engagement. It is intended to help the park better meet its legislative mandate to "commemorate the campaign and siege and defense of Vicksburg," and "restore the forts and the lines of fortifications, the parallels and the approaches of the two armies, or so much thereof as may be necessary to the purposes of the park." Key military engagement sites were identified through careful review of the military terrain that molded the events of May 19 through July 4, 1863, and its ability to convey the full range of events and activities that occurred. As currently envisioned, the key sites include the earthworks and artillery positions associated with the city approaches of Old Jackson Road/Battery DeGolyer/Third Louisiana Redan, Railroad Redoubt/Fort Garrott, and Graveyard Road. Post-Civil War additions to the landscape that relate to commemoration and park operations would be retained under this alternative.

This alternative assumes that BMPs, particularly regarding soil erosion control, would be used when removing tree cover in key areas. The areas proposed for conversion from forest to turf grass or native grass cover would be evaluated before clearing to reduce impacts on wetlands and avoid turf establishment on slopes too challenging to mow. Judicious manipulation of existing vegetation to enhance views would also be conducted as part of this alternative. Removal of small numbers of trees in front of positioned cannon or the limbing up and thinning of trees along the tour road to create more transparency are examples of this approach. A list of BMPs to be considered is included as Appendix B.

New interpretive strategies and programs would be provided to support visitor understanding of the key areas revealed through tree clearing. These might involve exhibits; opportunities for Living History; and augmentation of the demonstration area near the Visitor Center that currently features abatis, chevaux-de-frise, and artillery displays. Of particular interest is the re-establishment of spatial patterns associated with the 1863 battlefield landscape within view of the tour road corridor, and enhancement of visual connections to and between artillery positions of the opposing armies, fields of fire, and terrain features that can be tied to the military engineering of the two lines. This approach would prioritize interventions that enhance the experience of the visitor touring the park within a vehicle, as most visitors do.

Assumptions

- Preservation and stabilization of important natural, cultural, and historic resources are assumed under rehabilitation. Rehabilitation accommodates new uses and can make historic associations more apparent. There are many different resource types within the park, all of which are important to the history of the site. Examples of natural features that are crucial to understanding the history of the battlefield landscape include Mint Spring Bayou and the existing landform and topography. Examples of cultural features that are crucial to understanding the efforts of the veterans in establishing the park include monuments and tablets. Examples of historic features that are crucial to understanding the events of the Civil War siege include surviving earthworks.

- Implementation of this concept would follow the guiding and applied principles for approaching preservation of battlefields presented in the NPS summary of the August 1998 and March 2001 gathering, "Holding the High Ground; Principles and Strategies for Managing and Interpreting Civil War Battlefield Landscapes." Of particular note:

  – The management of battlefield landscapes would recognize the primacy of those historic resources identified in each park's enabling legislation—those resources that are at the heart of the visitor experience and the core of the park's preservation efforts. Cultural resources on Civil War battlefields would, therefore, be managed according to these priorities:

    - Those structures, features, landscapes, archeological resources, and viewsheds that constituted the wartime landscape.

    - Commemorative expressions by veterans and subsequent generations that reflect Americans' attempts to make sense of and derive meaning from the War.

    - Nationally significant post-War accretions on wartime landscapes.

    - Facilities (buildings, roads, trails, or media) erected by the government or other entities to interpret, support maintenance of, or provide access to battlefield landscapes.

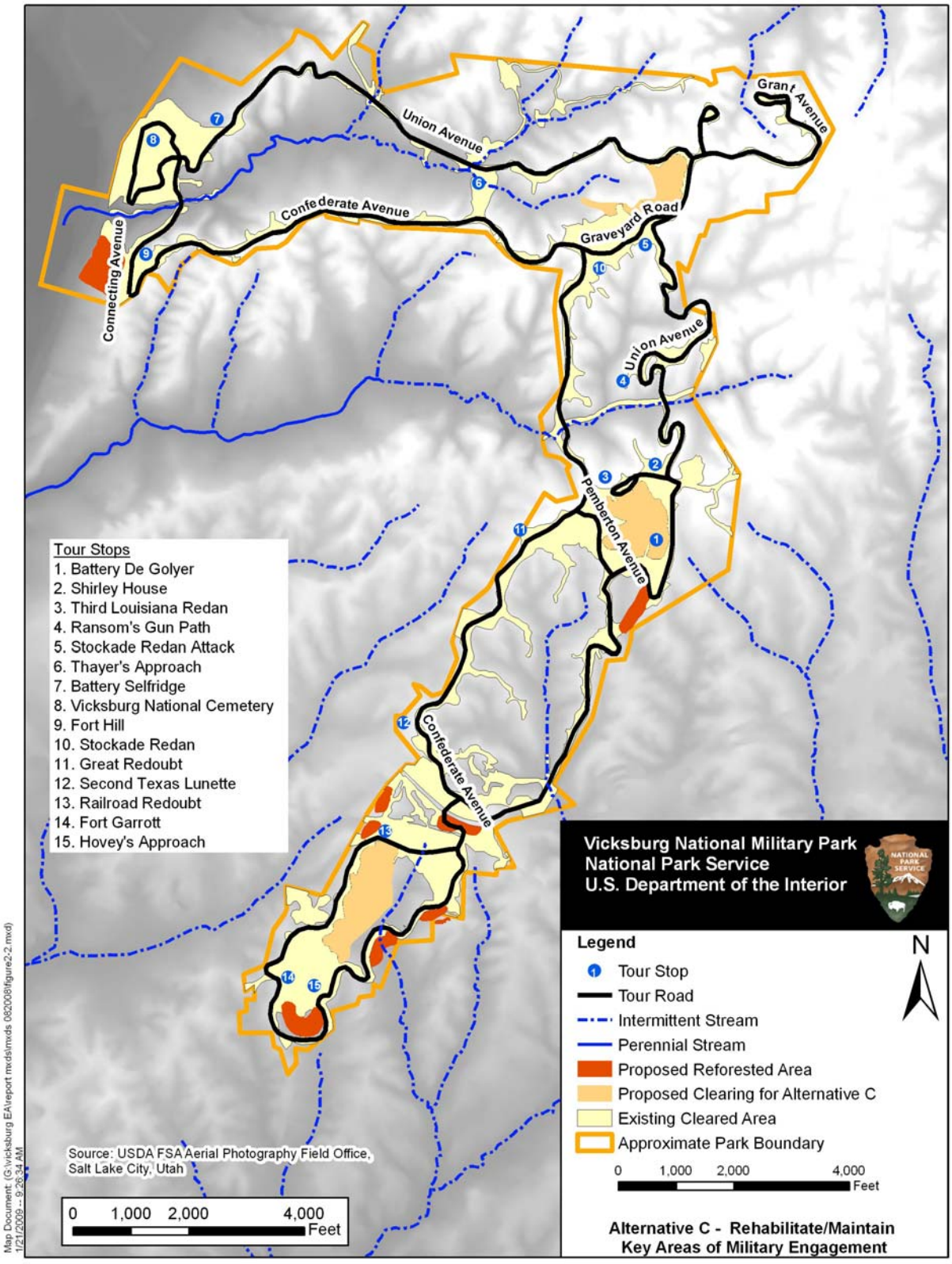
  – Additionally, battlefield managers remain committed to preserving all significant historic resources when they do not constitute a significant degradation of the primary battlefield landscape. When post-War resources adversely affect the primary battlefield landscape, NPS would develop solutions in close consultation with the SHPO and Advisory Council on Historic Preservation (ACHP), in accordance with NEPA and Section 106 of the NHPA.

  – Visitor uses would not adversely affect the integrity of park resources or the ability of visitors to understand and appreciate the mission/stories of the park.

- This alternative assumes that interpretation and education of visitors would feature authentic connections between physical resources and military events. Taking the entire siege into consideration, this alternative emphasizes stories associated with key areas of military engagement.

- As shown in Figure 2-2, the three key areas that would be considered priorities for providing enhanced views of and access to the battlefield for their ability to meet the park's mission of telling the story of the siege and attacks are Old Jackson Road/Battery DeGolyer/Third Louisiana Redan (with Old Jackson Road to Pemberton Avenue being of the highest importance), Railroad Redoubt/Fort Garrott, and Graveyard Road/Stockade Redan. These are assessed as follows:

Figure 2-2 Alternative C – Rehabilitate/Maintain Key Areas of Military Engagement



  - **Area 1 – Old Jackson Road/Battery DeGolyer/Third Louisiana Redan.** The stories of Union mining and related activities; the crater; the May 22, 1863, attacks; and the Shirley House would best be told here. Of the three key areas, this would be the easiest to maintain. Implementation of this alternative would benefit from the removal of the Old Administration Building, which would be addressed further by the park in a future planning process.

  - **Area 2 – Railroad Redoubt/Fort Garrott.** The stories of how Confederate fortifications guarded key terrain such as supply lines and the May 19 and 22, 1863, attacks would best be told here. This area would be the second easiest to maintain. Natural resource challenges include gleyed soils (soil that has been saturated over a long period of time, therefore reducing the iron and manganese content) and wetland areas.

  - **Area 3 – Graveyard Road/Stockade Redan.** This is the best place to tell the story of combat; the May 19 to 22, 1863, attacks; the construction methods and components of Stockade Redan; and a key Union avenue of approach. This would be the most difficult of the three to maintain. Natural resource challenges include wetlands, heavy forest, and Mint Spring Bayou.

- Parkland west of Thayer's Approach is the most heavily forested and has high potential for erosion. This area is less desirable to clear and would be left in its current condition, although consideration would be paid to exposing the visual connection between the water battery and Fort Hill.

- Other key natural resource areas to be protected in their current condition include:

  - Mint Spring and lower falls, a designated State natural landmark south of Vicksburg National Cemetery

  - Areas of exposed fossils along Mint Spring Bayou and elsewhere within the northwest corner of the park

  - Additional wetland resources revealed through the recently prepared park wetland delineation.

Implications of the Alternative. The following section indicates the relationship of the alternative to the issues common to all:

- The historic record is complete enough to adequately inform Landscape rehabilitation requirements for the most significant areas of the battlefield can be planned because details in the historic record are sufficient.

- Tree clearing would be an integral part of this alternative, but the area to be cleared would be the minimal necessary to convey the most important stories regarding the siege as identified by park and regional personnel.

- The primary landcover likely to replace trees is assumed to be turf grass or native grasses, although it may be possible in steeply sloped areas and ravines to approach landcover management in a manner similar to that used at Thayer's Approach, including less frequent mowing, burning, and the use of meadow species rather than Bermuda grass or other turf grasses requiring frequent mowing.

- Before implementing tree removal plans, the park would prepare a set of BMPs for the treatment and maintenance of new landcover in the three key interpretive areas where existing woodland cover is to

be removed. These BMPs may suggest an alternative landcover type to turf grass. Determination of the appropriate BMPs would require investigation into the range of vegetation types that allow for enhanced visual accessibility yet ensure retention of the existing soil profile and protect against erosion by using the park's maintenance capabilities. The BMPs would be developed by a team of park and regional personnel with expertise in natural resources, maintenance, military history, and interpretation, and potentially outside experts, and would be approved by the Superintendent. (See Appendix B for more information regarding BMPs.)

- Approximately 20 to 25 acres of the park would also be reforested to help protect the park's setting and critical viewsheds. Reforestation would involve the planting or natural regrowth of tree, shrub, and groundcover species representative of a desired future woodland composition. Species would be considered for their ability to contribute to a healthy native woodland appropriate to the cultural conditions of the site, such as mesic upland, xeric upland, or mesic to moist bottomland.

- Elsewhere, landcover modifications intended to improve visual connections to military terrain features and diminish visual obstructions would be considered. These may include various modifications ranging from selective tree removal and thinning to limbing up of trees.

- The removal of trees in some steeply sloped areas might occur cyclically rather than regularly to reduce maintenance costs.

- A protocol for monitoring the efficacy of any approach implemented would also be developed by the team. Adjustments would be made to the BMPs to address problems and issues identified through monitoring.

- Additional investigation into the alternatives for protecting loess soil from erosion through landcover management would be conducted annually and findings applied to revision of the BMPs. Investigation might include consultation with personnel involved with the management of local natural areas or large land parcels maintained in open vegetative cover that are successfully controlling erosion.

- Stump removal would occur based on site-specific conditions as follows:

  - In areas where mechanical maintenance would not occur, stumps would remain in place.

  - In areas where mowing or burning would occur, stumps would be removed.

- Enhanced monitoring of plants of special concern, birds, mammals, amphibians, reptiles, and water quality would be conducted in association with clearing or other changes in landcover. Adjustments to the treatment regime would be made if detrimental impacts are noted.

- This alternative provides an opportunity for improving interpretation and the range of recreational activities available to visitors, including:

  - Expanded interpretation of the Shirley House to highlight evidence of the residents who lived there before the siege.

  - Enhanced access to Mint Spring and associated waterfalls. A trail could be established to the waterfalls as a benefit to visitors. Issues to address include parking, trash collection, and coordination with ongoing stabilization efforts. Because this provision does not fall within

the park's legislated mandate, limited, if any, funds are available for it. The park would rely on the community to maintain the trail and collect litter.

- New trails to provide connections to interesting and important natural and cultural resources not currently accessible, such as Mint Spring Bayou and the CCC camp sites. Because this provision does not fall within the park's legislated mandate, limited, if any, funds are available for it. The park would rely on the community to maintain the trails and collect litter.

- The current Living History program could be expanded to include special events such as an "adventure camp" where visitors could experience the life of the soldier, Living History, or other guided activities. A rehabilitation approach to cultural landscape management allows for the establishment of much needed visitor services such as another picnic area, water fountains or bottled water vending machines, and restrooms. Bicycle riding would continue to be permitted on-road but not off-road. Horseback riding would remain prohibited to avoid potential for erosion and safety conflicts with vehicles along the road. Rehabilitation allows the addition of new interpretive media within the battlefield landscape.

Other Implications and Considerations

- Selective rehabilitation of portions of the battlefield does not provide a completely accurate depiction of the historic landscape during the battle and siege period.

Treatment Recommendations and Implementation Guidelines

The bullet points that follow outline the actions that taken together constitute this treatment alternative:

- Enhance the visual accessibility of three key areas of the battlefield landscape by removing existing forest cover and replacing it with low-growing grasses or other groundcover. Retain older native trees where they do not block important views, particularly those that afford shade along the tour road. The total area of forest cover to be converted to grass cover as part of this alternative is 90 acres.

- Clear trees to provide a view from the artillery placed at the South Fort park unit to visualize the avenues of approach they were intended to defend.

- Conduct tree thinning, limbing, and limited removal in specified areas along the tour road to facilitate visual connections between the artillery positions of the opposing lines. Allow trees to remain that do not interfere with desired views. Thinning and limbing up of trees associated with artillery positions would occur only in areas where visitors would benefit from this action through available access afforded by the tour road or proposed new parking pull-offs and trails. One specific area to be thinned is the view of the water battery from Fort Hill. Assume thinning and limbing operations would occur along approximately 3 total miles of the tour road, although the areas likely would not be contiguous.

- Provide two new waysides to interpret the Shirley House landscape before, during, and after the siege. Continue to convey information regarding the shebangs that were established on the slope below the house as housing for soldiers encamped there and other military features established on the property during the siege.

- Establish interpretive waysides to provide additional information regarding the newly cleared areas of the park. Provide one wayside each for the Confederate and Union perspectives within each of the three cleared areas (six total waysides).

- Provide an additional wayside within the park to interpret the role of CCC in stabilizing parkland during the 1930s through soil erosion control and the planting of trees that now constitute many of the large forested areas of the park.

- Establish new forest cover over 20 to 25 acres of the park to enhance screening of incompatible views and protect steep slope areas that do not contribute to park interpretation. Reforestation would be conducted in such a way as to promote a healthy native woodland appropriate to the cultural conditions of each area considered for conversion. See the list of native tree species provided in Appendix C for plants to be considered in the reforestation effort.

- Increase ranger patrols of areas potentially utilized by relic hunters to access the park. Newly opened areas may become a target for relic hunters and may require added protection, particularly immediately after clearing occurs.

- Establish a new trail within each of the three cleared areas. Design the trailhead and possibly a segment of each trail to be universally accessible. Because of the challenging terrain and potential for erosion, design the trails generally to follow existing topography and with a mown grass surface. Trails with mown grass surfaces would not be universally accessible. The waysides established at the accessible trailheads would provide an alternative interpretive experience for those unable to access the mown grass surfaced trails. Possible locations for these new trails include the approaches at Stockade Redan, Fort Garrott, and the assault routes of Railroad Redoubt. Assume a total length of 3 miles for these new trails, and that parking pull-offs already exist to provide access to them.

- Develop a 0.5-mile loop trail providing access to the Mint Spring Bayou waterfall. Assume the trail would include an accessible trailhead and possibly an additional accessible segment. Because of the terrain of the area, it is recommended that much of the trail be developed as a backcountry path surfaced with hard-packed earth. Provide a parking pull-off large enough for three cars along Connecting Avenue at the trailhead. Provide an interpretive brochure at the trailhead that describes how the park's natural conditions influenced military events. Additional NEPA compliance and supporting information would be necessary for the trail because there are currently not enough details available regarding the trail location and its proposed impacts to predict its impact on the natural and cultural environment. If the trail is constructed, a separate NEPA compliance document would be prepared. Additional discussion regarding a proposed Mint Spring trail would be deferred until preparation of this separate document.

- Provide as many as 20 additional benches, under shade trees, in places where visitors can be encouraged to get out of their cars.

The following elements were added to Alternative C during the "Choosing by Advantages" (CBA) workshop on June 24 and 25, 2008:

- Convert forest in key areas to open vegetative cover utilizing BMPs, and consider vegetative cover options now and in the future for their environmental sustainability.

- Evaluate annually the success of the converted units, and revise implementation strategies and BMPs accordingly. Document all findings, decisions, and updates to management protocols as part of this adaptive strategy.

- Expand and intensify by doubling current invasive alien plant species control programs and encourage the establishment of healthy native species. Include South Fort in the control program.

- Consider using the cleared areas for additional Living History programs. Provide opportunities for visitors to experience Living History activities in comfort by identifying a location with views of the area that might include shade trees and benches.

- Establish three new removable exhibits within the siege landscape to facilitate visitor understanding of missing military features such as earthworks and associated components, weaponry, obstacles, transportation and communication features, approach trenches and associated features, field hospital components, and/or soldier lifeway features. Consider locating the exhibits in the vicinity of Graveyard Road to feature Confederate earthworks elements such as the stockade fence; near the Shirley House to interpret Union efforts to reach the Third Louisiana Redan and shebangs, Coonskin tower, sapping, and sap rollers; and along the South Loop Road to interpret both Union and Confederate features associated with Fort Garrott and Hovey's Approach.

- Rehabilitate the Shirley House landscape to more closely approximate Civil War-era conditions. Reinstate features described in association with the property such as vegetable and flower gardens, fruit trees, and walks, and identify the locations of former outbuildings and structures associated with the dwelling precinct. Continue to convey information regarding the shebangs that were established on the slope below the house as housing for soldiers encamped there and other military features established on the property during the siege.

- Plant or retain shade trees in association with parking areas and roadside pull-offs where visitors would be encouraged to get out of their cars.

- Conduct wetland mitigation as described in the "Wetland Statement of Findings" (Appendix D) and summarized in Section 4.

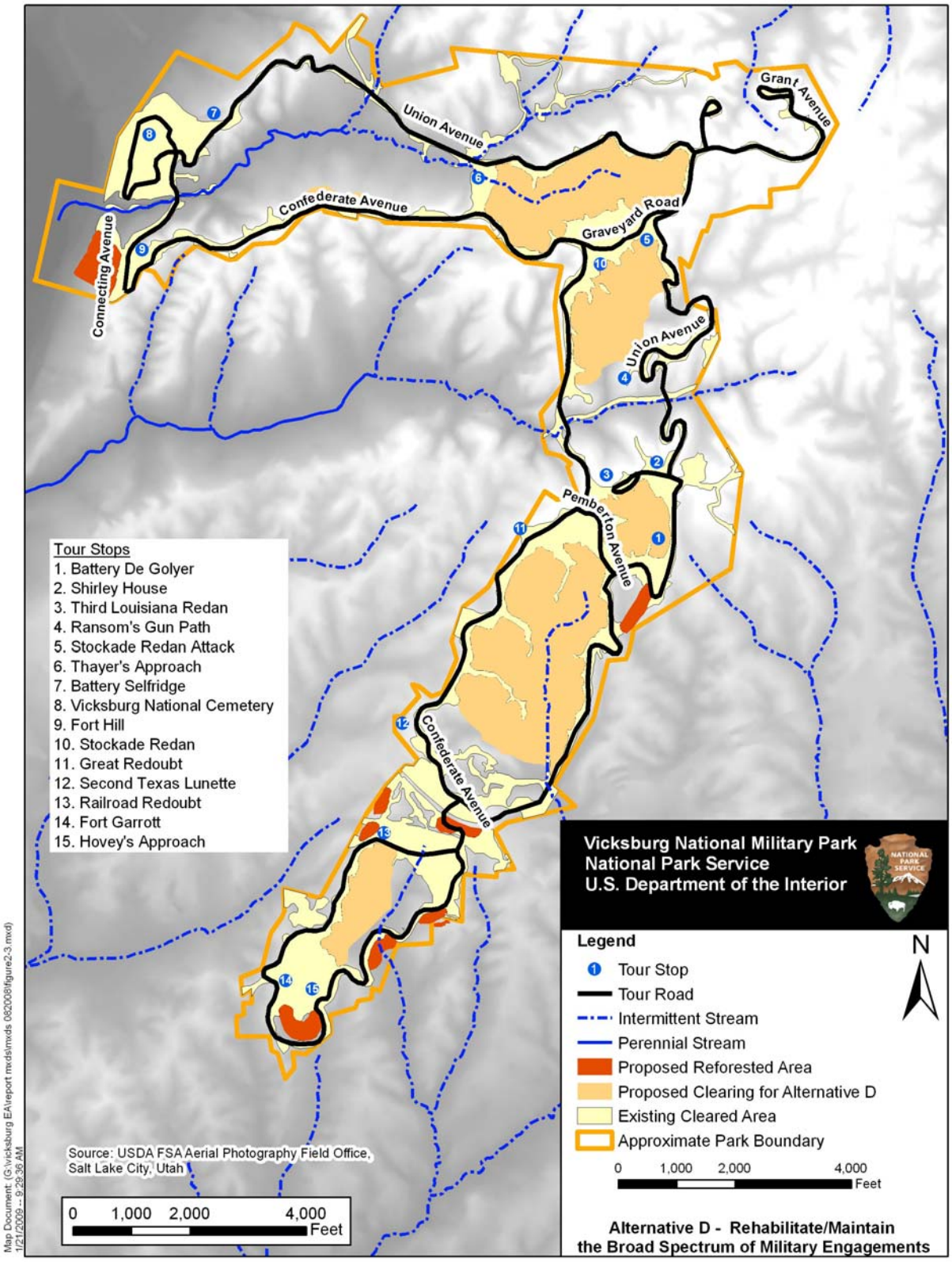
ALTERNATIVE D – REHABILITATE/MAINTAIN THE BROAD SPECTRUM OF MILITARY ENGAGEMENTS

This alternative focuses on enhancing the legibility of Civil War-era resources and associations by removing tree cover that has grown up since the end of the siege and currently obscures visual and physical relationships that were important to the events that occurred at Vicksburg in 1863. Historic imagery, such as 19th century lithographs of the siege landscape, would be used to guide rehabilitation and compatibility with the historic character of the landscape.

Tree clearing would occur in areas where military terrain analysis has indicated key battle and siege tactics of Union and Confederate commanders are evident and can be understood by visitors. As shown in Figure 2-3, woodlands would primarily be cleared in selected areas between Union and Confederate Avenues to reveal the opposing lines of fire. This already occurs in some areas of the park, but the extent of the current cleared area is insufficient and misleading and confusing to visitors. For example, in many locations, cannon face into dense stands of trees. Woodlands would primarily be replaced with turf or native grasses maintained by mowing. The frequency of mowing would depend in part on the severity of the cleared slopes.

Interpretation would be provided to help visitors understand what happened within these cleared areas. Post-Civil War additions to the landscape, including late 19th and early 20th century commemorative features and park operations features that support visitor use of the park, would be retained. Preservation and stabilization of important natural, cultural, and historic resources are assumed under rehabilitation, and would be taken into consideration in the development of implementation plans.

Figure 2-3 Alternative D – Rehabilitate/Maintain the Broad Spectrum of Military Engagements



There are many examples of various resource types within the park, all of which are important to the history of the site. Natural resource features that are crucial to understanding the history of the battlefield landscape include Mint Spring Bayou and the park's landform and topography. Examples of cultural features that are crucial to understanding the efforts of the veterans in establishing the park include the placement of monuments and tablets. Examples of historic features that are crucial to understanding the events of the Civil War siege include surviving earthworks.

Assumptions

- This alternative assumes that the best way to "commemorate the siege and preserve the history of the battles and operations of the siege and defense on the ground where they were fought and were carried on ..." is to reveal the landform, topography, and earthen fortifications associated with Union and Confederate lines and the landscape between them that was modified for offensive and defensive purposes.

- This alternative recognizes that some formerly cleared areas may not be feasible to clear today because of the potential for severe soil erosion.

- This alternative assumes that interpretation and education of visitors would feature authentic connections between physical resources and military events, using military terrain analysis as the basis for revealing the broadest range of stories associated with the Vicksburg landscape.

- Based on review and evaluation of the military history of the park, the most important area to be revealed through tree clearing and the re-establishment of Civil War patterns of spatial organization is the terrain between the Union and Confederate lines extending from Thayer's Approach and Fort Garrott.

- Screen plantings would be established or maintained to limit views of the Visitor Center, maintenance area, and Clay Street from cleared areas. Existing forest would remain in the area behind the Illinois Monument up to Old Jackson Road to protect the steeply sloped topography that could not be maintained through mowing, and to provide a visual screen for modern Jackson Road. Other areas that would not be cleared are located south of Fort Garrott and Grant's Circle. Screen plantings in these locations would buffer the park from Interstate 20 and would also be difficult to maintain under turf grass cover.

- This alternative would benefit from the relocation of the tour road and the nearby tour stop out of the ditch of the Great Redoubt. This alternative would also benefit from the removal of the Old Administration Building. However, these actions are best considered through preparation of a GMP and are not pursued as part of this alternative.

- Parkland to the outside edge of the tour road would not be cleared, and existing vegetation would remain as a visual screen.

- Fort Hill and the landscape west and north of Thayer's Approach would not be cleared because there was little military activity in this area, and most of the park's forest and natural resources, wetlands, and Mint Spring Bayou are within this area.

- Clearing to expose a visual connection to the water battery from Fort Hill is another localized effort that would support implementation of this alternative.

- Clearing of the vegetation along the perimeter of South Fort would also be conducted to provide a visual connection to the Mississippi River.

Implications of the Alternative. The following section indicates the relationship of the alternative to the issues common to all:

- This alternative involves extensive tree clearing. It would decrease the amount of forest habitat in the park.

- Reducing the diversity of landcover and plant community types represented within the park may or may not have a negative impact on the current wildlife communities within the park.

- This alternative may or may not increase the potential for soil erosion.

- The riskiest aspect of landcover conversion may be tree removal followed by replacement with a new landcover when soil disturbance is a real possibility, and the vehicle for protecting the soil from stormwater may take some time to become established. Particular attention would be paid to applying soil erosion control methods during this period.

- The wetland area within the South Loop landscape would be negatively affected by additional clearing. Riparian buffers along the stream that flows below Railroad Redoubt are warranted. This alternative would lead to a significant increase in maintenance requirements and costs because of the increase in the area to be mown, stormwater and surface water management issues, and the potential for increased soil erosion.

- Additional interpretation would accompany this alternative to provide visitors with a full understanding of battlefield events that benefits from the tree clearing. This may take the form of new waysides, Living History programs, and trails.

- This alternative would benefit from allowing visitors to begin their tour from the Confederate perspective. It also would benefit from the establishment of additional tour stops/pull-offs, and walking trails.

- This alternative may increase the potential for vandalism and relic hunting. Implementation of this alternative, and others, may require additional law enforcement and security efforts, an enhanced park watch program, and/or construction of features such as fences to prevent access from locales like Melborn Place.

- Relocation of the tour road near the Great Redoubt would involve major construction; alteration of the existing landform and topography; and relocation of gas, electrical, and telephone utility lines. One benefit would be the eradication of a stand of non-native cane. These actions are best considered through preparation of a GMP and would not be pursued as part of this alternative.

- A landcover of turf grass does not accurately represent conditions at the time of the battle.

- Approximately 20 to 25 acres of the park would be reforested to help protect the park's setting and critical viewsheds. Reforestation would involve the planting or natural regrowth of tree, shrub, and groundcover species representative of a desired future woodland composition. Species that would contribute to a healthy native woodland appropriate to the cultural conditions of the site, including mesic upland, xeric upland, or mesic to moist bottomland, would be considered for inclusion.

Treatment Recommendations and Implementation Guidelines

The bullet points that follow outline the actions that taken together constitute this treatment alternative:

- Enhance the visual accessibility of the battlefield landscape by removing existing forest cover over approximately 350 acres and replacing it with a low groundcover that does not interfere with visual access of the enhanced areas. Also clear trees blocking the view of the water battery from Fort Hill and clear trees from the margins of South Fort to reinstate historic views from the artillery positions. Bermuda grass, native grasses and forbs, and other groundcovers would be considered for their use in newly cleared areas. The type of groundcover to be used in each area would be based on an assessment of park capabilities in terms of implementation and maintenance.

- Utilize the cleared areas for additional Living History interpretation.

- Establish 10 interpretive waysides to provide additional information regarding the newly cleared areas of the park. Depict information regarding both the Confederate and Union perspectives within the newly cleared areas.

- Provide two new waysides to interpret the Shirley House landscape before, during, and after the Civil War siege. Continue to convey information regarding the shebangs that were established on the slope below the house as housing for soldiers encamped there.

- Conduct tree thinning, limbing, and limited removal in specified areas along the tour road, where clearing is not undertaken, to facilitate visual connections between artillery positions of the opposing lines.

- Establish new forest cover over 20 to 25 acres of the park to enhance screening of incompatible views and protect steep slope areas that do not contribute to park interpretation. Reforestation would be conducted in such a way as to promote a healthy native woodland appropriate to the cultural conditions of each area considered for conversion. See the list of native tree species included under Alternative C for plants to be considered in the reforestation effort.

- Increase ranger patrols in areas potentially utilized by relic hunters to access the park. Newly opened areas may become a target for relic hunters and may require added protection, particularly immediately after clearing. Clearly mark boundaries with signs that warn of the legal implications of relic hunting. Establish surveillance cameras in two of the most accessible areas to monitor activity along the park boundary.

- Establish five new walking trails in association with the newly cleared areas. Possible locations for these new trails include the approaches at Stockade Redan, Fort Garrott, Ransom's Path, and Hovey's Approach, and the assault routes on Railroad Redoubt. Assume a total length of 5 miles for these new trails, and that parking pull-offs already exist to provide access to them.

- Develop a 1-mile loop trail providing access to the Mint Spring Bayou waterfall and other areas within the ravine to afford an understanding of the Confederate fortified position atop the ridge above. Assume the trailhead and possibly a segment of the trail would be accessible; however, because of the terrain, it is recommended that the majority of the system be designed as a backcountry trail surfaced in hard-packed earth. Provide a parking pull-off large enough for five cars along Connecting Avenue at the trailhead. Provide an interpretive brochure at the trailhead

that describes how the park's natural resources influenced the military events that occurred there. As in Alternative C, additional NEPA compliance and supporting information would be necessary for the trail because there are not currently enough details available regarding the trail location and its proposed impacts to predict its impact on the natural and cultural environment. If the trail is constructed, a separate NEPA compliance document would be prepared. Additional discussion regarding a proposed Mint Spring trail would be deferred until preparation of this separate document.

- Provide as many as 25 new benches in association with new or existing shade trees in areas where visitors can be encouraged to get out of their cars and experience the park up close.

- Implement wetland mitigation as described in the "Wetland Statement of Findings" (Appendix D) and summarized in Section 4.

Alternatives Considered but Dismissed

Two alternatives were considered but dismissed. The two alternatives were Alternative E – Restoration to Civil War Siege Period (circa 1863) and Alternative F – Restoration to Park Development Period (1899 to 1917). Implementation of either of these alternatives would require the re-acquisition of former parkland that has been heavily impacted by adjacent development. Both alternatives would require extensive tree clearing and replanting of ground cover. Extensive resources would be required to maintain the ground cover. Monumentation would be removed, and interpretive resources would be displayed at an alternative location to avoid introducing elements that are out of character with the restoration periods. Exceptions would also have to be made for the inclusion of features that do not date to the specified restoration period, such as commemorative monuments and the Visitor Center, which would negate the guiding concept of the alternatives. For these reasons, Alternatives E and F were dismissed as being not reasonable.

COST

The rough order of magnitude costs of implementing the alternatives were evaluated during the scoping process. For the purposes of comparing costs, general assumptions were made regarding the extent of the work to be undertaken, amount of staff needed, and materials that would be purchased. The assumptions were made based on costs of previous park actions as well as existing park operating costs. The costs are not intended to replace more detailed consideration of operational needs and final construction estimates and should not be used as a basis for funding requests or budgeting. The rough order of magnitude cost associated with each alternative is presented in Table 2-1.

Table 2-1 Rough Order of Magnitude Cost Comparison of the Alternatives

	Alternative A	Alternative B	Alternative C	Alternative D
One-time cost	—	$ 1,056,000	$ 1,083,400	$ 2,531,400
New annual costs	—	$ 72,000	$ 240,500	$ 187,200
Annual costs	$ 147,400	$ 219,300	$ 385,300	$ 332,000

Costs for Alternative A include the annual maintenance costs for maintaining the existing clearings and grassed areas at Vicksburg NMP.

Alternative B one-time costs include clearing of three 10-acre BMP areas; privet eradication activities; and construction/fabrication of interpretive exhibits, waysides, and other proposed elements. Alternative

B annual costs include existing maintenance costs described for Alternative A; maintenance of the three 10-acre BMP areas; and maintenance of the new interpretive exhibits, waysides, and other proposed elements.

Alternative C one-time costs include clearing of the 90-acre rehabilitation areas and three 10-acre BMP areas; other tree clearing/thinning/replanting; privet eradication activities; wetland mitigation; and construction/fabrication of interpretive exhibits, waysides, and other proposed elements. Alternative C annual costs include existing maintenance costs described for Alternative A; maintenance of the 90-acre rehabilitation areas and three 10-acre BMP areas; additional invasives control; additional ranger patrols; trail maintenance; and maintenance of the new interpretive exhibits, waysides, and other proposed elements.

Alternative D one-time costs include clearing of the 350 acre rehabilitation areas; other tree clearing/thinning/replanting; wetland mitigation; and construction/fabrication of interpretive exhibits, waysides, and other proposed elements. Alternative D annual costs include existing maintenance costs described for Alternative A; maintenance of the 350-acre rehabilitation areas; additional ranger patrols; trail maintenance; and maintenance of the new interpretive exhibits, waysides, and other proposed elements. Annual costs for Alternative D are less than those for Alternative C because Alternative D does not include extensive ongoing vegetation and invasives controls included as a part of Alternative C.

IDENTIFICATION OF THE PREFERRED ALTERNATIVE

Alternative C was selected as the preferred alternative. A discussion of the NPS selection process follows.

The no action alternative, Alternative A, would maintain the existing interpretive exhibits and landscape condition in the park. The three action alternatives would include different ways of making the cultural landscape and the story of Vicksburg more accessible to park visitors through various interpretive programs, including technology and media exhibits and through clearing of the landscape. Alternative B (preservation through BMPs) would focus on technology and media exhibits as an important means of visitor interpretation, as well as protecting the existing cultural landscape through implementation of BMPs. Alternative C (rehabilitate/maintain areas of key military engagements) and Alternative D (rehabilitate/maintain the broad spectrum of military engagements) would focus on clearing of the cultural landscape as a primary means of interpretation. Alternative C would involve clearing in three key areas of activity during the siege, totaling approximately 90 acres, while Alternative D would involve clearing of a broader area of military activity totaling approximately 350 acres.

These three action alternatives and the no action alternative were evaluated using a process called "Choosing by Advantages" (CBA) during meetings at Vicksburg NMP on June 24 and 25, 2008. The CBA process determines which alternative would provide the greatest advantage. To ensure a logical and trackable process, the criteria used to evaluate the alternatives were derived from the plan objectives and issue statements, which in the CBA process are called "attributes" and "factors." This process evaluated alternatives by identifying and comparing the relative advantages of each according to a set of criteria. The alternatives were rated on how well they would meet the following attributes and factors or would have an advantage in meeting each attribute and factor.

Alternatives were evaluated to determine how well they would:

- Facilitate understanding and interpretation of the park story
- Allow visitors to experience history up close

- Provide opportunities for various visitor experiences while maintaining the historic character and integrity of the landscape and managing visitor use conflicts
- Protect physical features and resources from degradation
- Develop sustainable ways of maintaining the landscape with focus on natural resources and park maintenance
- Protect natural features relative to their place in achieving the purpose of the park
- Protect sensitive species
- Develop efficient and effective ways of interpreting the landscape

Alternative C received the highest score of the four alternatives evaluated and therefore is the NPS-preferred alternative. Alternative C would provide the widest range of benefits to park visitors, the natural and cultural environments, and park maintenance, with minimal environmental degradation. Alternative A would not meet the purpose and need of the EA. Alternative B would provide various visitor use experiences but would not expose the cultural landscape of the siege activities so that the visitor can understand the Vicksburg campaign. Although Alternative D would reveal more of the cultural landscape than Alternative C, implementation of Alternative D would create greater impacts to park natural resources, including extensive wetland/stream impacts.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

The environmentally preferred alternative is defined by CEQ as the alternative that best meets the following criteria or objectives, as set out in NEPA (Section 101):

1. Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.
2. Ensure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings.
3. Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.
4. Preserve important historical, cultural, and natural aspects of our national heritage and maintain, whenever possible, an environment that supports diversity and variety of individual choice.
5. Achieve a balance between population and resource use that would permit high standards of living and a wide sharing of life's amenities.
6. Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Alternative C received the highest score of the four alternatives evaluated, and it is the environmentally preferred alternative. All of the alternatives equivalently address Items 2, 5, and 6 by providing for the protection of the cultural and natural landscape features in a safe, healthful, and environmentally responsible and sustainable manner. Alternative A (the no action alternative) scores lower than the other alternatives in Items 1, 3, and 4, as it does not preserve the cultural landscape as well as the three other alternatives.

SUMMARY OF ALTERNATIVES AND IMPACTS

Table 2-2 is a summary of alternatives considered as well as expected impacts. A discussion of the affected environment and environmental consequences is provided in Sections 3 and 4.

Table 2-2 Summary of Alternatives and Impacts

Impact Topic	Alternative A Continue Existing Management (No Action)	Alternative B Preservation Through BMPs	Alternative C Rehabilitate/Maintain Key Areas of Military Engagement	Alternative D Rehabilitate/Maintain the Broad Spectrum of Military Engagements	Proposed BMPs	Proposed Mitigation
RECREATIONAL RESOURCES, AESTHETICS, AND VISITOR EXPERIENCE						
Visitor Use and Experience (Including Recreational Resources)	Minor long-term adverse impacts would occur on visitors interested in historic interpretation because visitors have limited opportunities to understand and visualize the campaign. No impacts on visitors using the park for recreation or enjoying nature.	Minor to moderate long-term beneficial impacts would occur on visitors interested in historic interpretation because of expanded interpretation of the Vicksburg campaign. Negligible long-term beneficial impacts on visitors using the park for recreation or enjoying nature. Minor short-term adverse impacts during land disturbance activities and construction.	Moderate long-term beneficial impacts would occur on visitors interested in historic interpretation because of expanded interpretation and enhanced visualization of the battlefields of the Vicksburg campaign. Negligible to minor beneficial impacts on visitors using the park for recreation. Minor adverse impacts on visitors using the park for enjoying nature. Minor to moderate short-term adverse impacts during land disturbance activities and construction.	Moderate to major long-term beneficial impacts would occur on visitors interested in historic interpretation because of expanded interpretation and enhanced visualization of the battlefields of the Vicksburg campaign. Negligible to minor beneficial impacts on visitors using the park for recreation. Moderate adverse impacts on visitors using the park for enjoying nature. Moderate short-term adverse impacts during land disturbance activities and construction.	Conduct clearing operations during seasons when visitor numbers are low. Notify potential visitors of pending clearing operations.	None required.

Impact Topic	Alternative A Continue Existing Management (No Action)	Alternative B Preservation Through BMPs	Alternative C Rehabilitate/Maintain Key Areas of Military Engagement	Alternative D Rehabilitate/Maintain the Broad Spectrum of Military Engagements	Proposed BMPs	Proposed Mitigation
Viewsheds and Aesthetics (Including Recreational Resources)	Minor long-term adverse impacts would occur on visitors interested in historic interpretation as existing forest stands mature and expand, preventing viewing of the battlefields. No impacts on visitors using the park for recreation or enjoying nature.	Minor long-term beneficial impacts would occur on visitors interested in historic interpretation as viewsheds are maintained, BMPs are implemented, and invasives are controlled. Negligible to minor long-term beneficial impacts on visitors using the park for recreation or enjoying nature. Minor short-term adverse impacts during land disturbance activities and construction.	Minor to moderate short-term adverse impacts from construction activities on all visitors. Long-term moderate beneficial impacts would occur on visitors interested in historic interpretation as significant tree clearing enhances current viewsheds of the battlefields. Negligible long-term beneficial impacts on visitors using the park for recreation. Minor long-term adverse impacts on visitors using the park to enjoy nature.	Moderate short-term adverse impacts from construction activities on all visitors. Long-term moderate to major beneficial impacts would occur on visitors interested in historic interpretation as significant tree clearing enhances current viewsheds of the battlefields. Negligible long-term beneficial impacts on visitors using the park for recreation. Moderate long-term adverse impacts on visitors using the park to enjoy nature.	None proposed.	None required.

Impact Topic	Alternative A Continue Existing Management (No Action)	Alternative B Preservation Through BMPs	Alternative C Rehabilitate/Maintain Key Areas of Military Engagement	Alternative D Rehabilitate/Maintain the Broad Spectrum of Military Engagements	Proposed BMPs	Proposed Mitigation
CULTURAL RESOURCES						
Cultural Landscapes	Negligible to minor long-term adverse impacts would occur on cultural landscapes as existing forest stands mature and expand, preventing viewing of the battlefields.	Negligible to minor long-term beneficial impacts would occur on cultural landscapes under Alternative B as establishment of turf and limited tree clearing preserve cultural landscape features. The proposed alternative would have no adverse effect on NRHP-eligible cultural resources under Section 106 of the NHPA.	Minor to moderate long-term beneficial impacts would occur on cultural landscapes under Alternative C as establishment of turf and tree clearing preserve cultural landscape features. Potential long-term negligible to minor adverse impacts from erosion concerns. The proposed alternative would have no adverse effect on NRHP-eligible cultural resources under Section 106 of the NHPA.	Moderate long-term beneficial impacts would occur on cultural landscapes under Alternative D as establishment of turf and tree clearing preserve cultural landscape features. Potential long-term minor adverse impacts from erosion concerns. The proposed alternative would have no adverse effect on NRHP-eligible cultural resources under Section 106 of the NHPA.	None proposed.	None required.
Historic Resources	Negligible long-term impacts on historic resources because current management would be maintained.	Negligible short-term adverse impacts on historic resources as historic features are protected. No long-term impacts. The proposed alternative would have no adverse effect on NRHP-eligible cultural resources under Section 106 of the NHPA.	Minor long-term beneficial impacts on historic resources because historic features would be protected. Minor short-term adverse impacts during land disturbance activities and construction. The proposed alternative would have no adverse effect on NRHP-eligible cultural resources under Section 106 of the NHPA.	Minor to moderate long-term beneficial impacts on historic resources because historic features would be protected. Minor short-term adverse impacts during land disturbance activities and construction. The proposed alternative would have no adverse effect on NRHP-eligible cultural resources under Section 106 of the NHPA.	Include historic landscape expert in planning. Conduct clearing operations with minimal ground disturbance. Shift ground disturbing activities to avoid identified resources. Develop a plan of action if resources are discovered.	None required.

Impact Topic	Alternative A Continue Existing Management (No Action)	Alternative B Preservation Through BMPs	Alternative C Rehabilitate/Maintain Key Areas of Military Engagement	Alternative D Rehabilitate/Maintain the Broad Spectrum of Military Engagements	Proposed BMPs	Proposed Mitigation
Archeological Resources	Negligible long-term impacts on archeological resources because current management would be maintained.	Negligible long-term beneficial impacts on archeological resources. The proposed alternative would have no adverse effect on NRHP-eligible cultural resources under Section 106 of the NHPA.	Minor long-term adverse impacts would occur on archeological resources under Alternative C because cleared areas have higher likelihood for disturbance by relic hunters. Minor short-term adverse impacts during land disturbance activities and construction. The proposed alternative would have no adverse effect on NRHP-eligible cultural resources under Section 106 of the NHPA.	Minor long-term adverse impacts would occur on archeological resources under Alternative D because cleared areas have higher likelihood for disturbance by relic hunters. Minor short-term adverse impacts during land disturbance activities and construction. The proposed alternative would have no adverse effect on NRHP-eligible cultural resources under Section 106 of the NHPA.	Include archeologist in planning. Conduct clearing operations with minimal ground disturbance. If warranted, conduct subsurface testing. Shift ground disturbing activities to the extent possible to avoid identified resources. Qualified archeologist would be on-call to monitor activities. Develop a plan of action if resources are discovered.	None required.

Impact Topic	Alternative A Continue Existing Management (No Action)	Alternative B Preservation Through BMPs	Alternative C Rehabilitate/Maintain Key Areas of Military Engagement	Alternative D Rehabilitate/Maintain the Broad Spectrum of Military Engagements	Proposed BMPs	Proposed Mitigation
NATURAL RESOURCES						
Soils and Geologic Hazards	Minor long-term adverse impacts would occur from existing erosion problems.	Long-term negligible to minor beneficial impacts would occur from BMPs implemented to halt erosion. Negligible short-term adverse impacts during land disturbance activities and construction.	Long-term minor beneficial impacts would occur from larger cleared areas and lower potential for erosion. Minor short-term adverse impacts during land disturbance activities and construction.	Long-term minor beneficial impacts would occur from larger cleared areas and easier detection of erosion. Minor short-term adverse impacts during land disturbance activities and construction.	Follow applicable Mississippi Forestry Commission BMPs (Appendix B). Reduce use of heavy vehicles. Restrict operations to periods when soil is firm. Remove felled trees without dragging. Cut and grind stumps (do not uproot them). Use soil stabilization blankets, silt fences, or straw bale barriers to retard erosion from bare soil. Stabilize soil and reduce erosion after clearing, such as by planting groundcover promptly, but without disturbing the bare surface. Promptly remove or restore any temporary haul roads.	None required.

Impact Topic	Alternative A Continue Existing Management (No Action)	Alternative B Preservation Through BMPs	Alternative C Rehabilitate/Maintain Key Areas of Military Engagement	Alternative D Rehabilitate/Maintain the Broad Spectrum of Military Engagements	Proposed BMPs	Proposed Mitigation
Air Quality and Temperature	Negligible long-term impacts on air quality because current management would be maintained.	Negligible beneficial long-term impacts on air quality because current management would be maintained. Negligible short-term adverse impacts during land disturbance activities and construction.	Negligible to minor short-term and long-term adverse impacts on local air quality from increased localized temperatures and emissions from maintenance equipment.	Minor short-term and long-term adverse impacts on local air quality from increased localized temperatures and emissions from maintenance equipment.	None proposed.	None required.
Surface Water Quality and Streamflow Characteristics	Negligible long-term impacts on water quality and quantity as current management is maintained.	Long-term negligible beneficial impacts on water quality from application of BMPs to prevent erosion and provide vegetative buffers. Negligible short-term adverse impacts during land disturbance activities and construction.	Short-term negligible adverse impacts on water quality because of increased erosion. Long-term negligible adverse impacts on water quantity and streamflow because of increased runoff from removal of vegetation. Minor short-term adverse impacts during land disturbance activities and construction.	Long-term minor adverse impacts on water quality because of removal of vegetative buffers. Long-term minor adverse impacts on water quantity and streamflow because of increased runoff from removal of vegetation. Minor short-term adverse impacts during land disturbance activities and construction.	Follow applicable Mississippi Forestry Commission BMPs (Appendix B). Develop Erosion and Sediment Control Plan. Submit an application to State for general stormwater permit for construction sites. Develop strict Spill Prevention, Control, and Countermeasures Plans.	None required.

Impact Topic	Alternative A Continue Existing Management (No Action)	Alternative B Preservation Through BMPs	Alternative C Rehabilitate/Maintain Key Areas of Military Engagement	Alternative D Rehabilitate/Maintain the Broad Spectrum of Military Engagements	Proposed BMPs	Proposed Mitigation
Wetlands	Negligible long-term impacts on wetlands because current management would be maintained.	Negligible long-term beneficial impacts on wetlands from application of BMPs to prevent erosion and protect existing features.	Long-term minor adverse impacts on wetland areas from clearing and removal of vegetation in wetlands and/or conversion of 7 acres of forested wetlands to scrub-shrub or emergent wetlands. Moderate short-term adverse impacts during land disturbance activities and construction.	Long-term moderate adverse impacts on wetland areas from clearing and removal of vegetation in wetlands and/or conversion of 97 acres of forested wetlands to scrub-shrub or emergent wetlands, especially along Durden Creek and tributaries to Mint Spring Bayou and Glass Bayou. Moderate short-term adverse impacts during land disturbance activities and construction.	Follow applicable Mississippi Forestry Commission BMPs (Appendix B).	Per Wetland SOF (Appendix D), conduct wetland mitigation activities, including maintaining and replanting stream and wetland buffers, restoring disturbed wetland areas, and conducting invasive species removal in wetlands.
Vegetation	Negligible to minor long-term impacts on vegetation because current management would be maintained. Invasive species would continue to expand within park property.	Negligible to minor long-term beneficial impacts on vegetation from application of BMPs to prevent erosion and control of invasives.	Long-term minor adverse impacts on vegetation from Alternative C clearing and conversion from forested woodlands to open meadow systems of Bermuda grass. Minor short-term adverse impacts during land disturbance activities and construction.	Long-term moderate adverse impacts on vegetation from Alternative D clearing and conversion from forested woodlands to open meadow systems of Bermuda grass. Moderate short-term adverse impacts during land disturbance activities and construction.	Follow applicable Mississippi Forestry Commission BMPs (Appendix B).	None required.

Impact Topic	Alternative A Continue Existing Management (No Action)	Alternative B Preservation Through BMPs	Alternative C Rehabilitate/Maintain Key Areas of Military Engagement	Alternative D Rehabilitate/Maintain the Broad Spectrum of Military Engagements	Proposed BMPs	Proposed Mitigation
Wildlife and Habitat	Negligible long-term beneficial impacts on locally sensitive species and habitat from current management.	Long-term negligible beneficial impacts on locally sensitive species and habitat from application of BMPs and control of invasive species. Negligible short-term adverse impacts during land disturbance activities and construction.	Long-term minor adverse impacts on locally sensitive species that might use park woodlands, and long-term minor to moderate beneficial impacts on locally sensitive floral species that currently use park meadows. Minor short-term adverse impacts during land disturbance activities and construction.	Long-term minor to moderate adverse impacts on locally sensitive species that might use park woodlands, and long-term minor to moderate beneficial impacts on locally sensitive floral species that currently use park meadows. Moderate short-term adverse impacts during land disturbance activities and construction.	None required.	None proposed.
Species of Special Concern	Negligible long-term impacts on protected species from current management.	Long-term negligible beneficial impacts on protected species due to the application of BMPs and control of invasive species. Negligible short-term adverse impacts during land disturbance activities and construction.	Long-term negligible adverse impacts on protected species that might use the park woodlands, and long-term negligible to minor beneficial impacts on protected species that use park meadows. Minor to moderate short-term and long-term beneficial impacts on prairie nymph. Minor short-term adverse impacts during land disturbance activities and construction.	Long-term negligible to minor adverse impacts on protected species that might use the park woodlands, and long-term negligible to minor beneficial impacts on protected species that use park meadows. Minor to moderate short-term and long-term beneficial impacts on prairie nymph. Minor short-term adverse impacts during land disturbance activities and construction.	None required.	None proposed.

Impact Topic	Alternative A Continue Existing Management (No Action)	Alternative B Preservation Through BMPs	Alternative C Rehabilitate/Maintain Key Areas of Military Engagement	Alternative D Rehabilitate/Maintain the Broad Spectrum of Military Engagements	Proposed BMPs	Proposed Mitigation
NPS OPERATIONS AND FACILITIES						
Long-term Management and Sustainability of Resources	Negligible long-term impacts on park operations because current management would be maintained.	Minor long-term adverse impacts on park operations for maintenance of BMPs and additional interpretive technology. Minor short-term adverse impacts during land disturbance activities and construction.	Minor to moderate long-term adverse impacts on park operations for maintenance of cleared areas. Minor short-term adverse impacts during land disturbance activities and construction.	Minor to moderate long-term adverse impacts on park operations for maintenance of cleared areas. Minor short-term adverse impacts during land disturbance activities and construction.	None required.	None proposed.

3. AFFECTED ENVIRONMENT

3. AFFECTED ENVIRONMENT

INTRODUCTION

The "affected environment" is defined as the resources expected to experience environmental impacts (NPS, 2001). The following discussions highlight resources and other management considerations of the park that could be impacted by implementation of the planning alternatives. This section addresses the existing conditions of the impacted resources at the park.

RECREATIONAL RESOURCES, AESTHETICS, AND VISITOR EXPERIENCE

Recreational Resources

Vicksburg NMP has averaged approximately 850,000 visitors per year over the past 20 years (NPS, 2008b). Park attendance has varied over the past 6 years from a high of 1,023,370 in 2002 declining to 555,108 visitors in 2008. The peak attendance season is from March through July, with July being the busiest month on average.

Recreational land uses associated with the park include walking and biking along the park tour road, and hiking along the park's wooded trail. Every March since 1980, an annual road race called "The Vicksburg Run Thru History" is held at the park. Three courses – 5- and 10-kilometer and 1-mile routes – take runners through the park on the tour road, and its challenging, hilly terrain (NPS, 2009).

Visitor Use and Experience

The primary use of Vicksburg NMP is education, museum, and interpretive experiences. Other uses include commemoration, visitor services, recreation, administration, and maintenance. Vicksburg NMP is frequently used for military training purposes (NPS, 2009).

Education/Museum/Interpretation. Opportunities for education and interpretation include exhibits and park rangers available at the Visitor Center and the *USS Cairo* Museum; interpretive tour stops along the park tour road; and the numerous tablets, monuments, and markers located throughout the park that help to convey the stories of the 1863 siege and military engagements to the visitor. The park also conducts a "Living History" program each summer, in which rangers and volunteers offer interpretive talks and demonstrations to the public. These include artillery and rifle firings and demonstrations of drills performed by Civil War soldiers conducted at the reconstructed earthworks at the Visitor Center (NPS, 2009).

Commemoration. Vicksburg NMP is one of the most heavily monumented parks in the world and has more than 1,340 monuments, statues, busts, relief panels, tablets, and markers that honor commanders as well as common soldiers, and identify places on the battlefield where troops were positioned and where significant action took place. All but one of the states that maintained troops at Vicksburg have installed a memorial to their soldiers at the park (NPS, 2009).

Visitor Services. Visitor services provided by the park include ranger contact, comfort stations, water fountains, a gift shop, interpretive films, museum facilities, and picnic areas. Most of these are available in the Visitor Center and the *USS Cairo* Museum (NPS, 2009).

Military Training. The U.S. Armed Forces frequently conducts staff rides (educational exercises to observe the operational execution of the Vicksburg campaign) for the training of military officers at Vicksburg NMP (NPS, 2009).

Aesthetics

Views within the park focus on the military terrain associated with many Civil War fortifications, as visible from the park tour road system. Areas maintained in mown grass afford broad and sometimes dramatic views. Tree cover and woodland vegetation limit the extent of many views. In many locations, woodland cover occupying ravines currently blocks views associated with the historic field of fire of artillery pieces, or visual connections that existed between opposing fortification systems. Occasional openings through the dense vegetation offer vistas across ravines. There are also maintained visual connections between monuments and fortifications, and to monuments from road corridors. For example, from Pemberton Avenue there is a direct visual connection to the Great Redoubt and Louisiana State Monument (NPS, 2009). The park's 1,800 acres consists of approximately 70 percent forest and 30 percent mown turf and field.

One of the most expansive views occurs along the park's northwestern margin. The topography in this area includes Fort Hill, which affords long views toward Louisiana across the Yazoo River Diversion Canal, flowing in the former channel of the Mississippi River. From Union Avenue near Battery Selfridge, there are dramatic views of the Yazoo Diversion Canal, the *USS Cairo*, and the alluvial plain beyond (NPS, 2009).

Views to non-historic features such as the contemporary Jackson Road corridor are screened through use of a separated grade crossing and woodland vegetation, including screen vegetation. Screen plantings help mitigate views of residential development along the park's eastern and western margins (NPS, 2009).

The park has recently conducted several woodland clearing projects to enhance historic viewsheds. The most obvious of these is in association with the Railroad Redoubt. Also recently cleared have been Fort Garrott and Hovey's Approach, and the area south of Kentucky Avenue, including the zigzag trenches of the Union approach (NPS, 2009).

Specific information regarding aesthetics and viewsheds is not available for the proposed rehabilitation areas associated with each proposed alternative. The existing viewsheds in the areas proposed to be cleared in Alternatives C and D consist of forested land. Photographs 3-1 and 3-2 are representative of the aesthetics and viewsheds in the proposed rehabilitation areas.

CULTURAL RESOURCES

Cultural Landscapes

A cultural landscape is a geographic area, including both cultural and natural resources and the wildlife and domestic animals therein, associated with a historic event, activity, or person, or exhibiting other cultural or aesthetic value. Several cultural landscapes have been identified at Vicksburg NMP, including the main battlefield and associated non-contiguous parcels along the river, Vicksburg National Cemetery, the Shirley House landscape, and the Pemberton House landscape.

The characteristics and components of these landscapes contribute greatly to the significance and integrity of the battle and siege period, as well as the park's identified secondary periods of significance. Identified landscape features include eight historic earthen forts; numerous gun emplacements; over 20 miles of reconstructed trenches, approaches, and parallels; the last remaining section of Grant's Canal; a tour road system; and an extensive collection of commemorative monuments. The park contains open viewsheds covered by over 550 acres of maintained turf grass, as well as dense forest, much of which was planted by CCC in the 1930s to alleviate severe soil erosion.

Photograph 3-1 Example of Viewshed along the Tour Road

Photograph 3-2 Example of Viewshed along the Tour Road

The park's landscape features are essential to the interpretation of the historic battle and in understanding the wide variety of military operations and tactics used at Vicksburg. For example, military strategists and commanders for both Confederate and Union forces considered the high bluffs, steep rugged ravines, and unique properties of the loess soil in devising their military tactics. Also, during the siege, both armies cut trees to provide materials for defense fortifications or to clear the line of fire between combatants. Today, many of these landscape features are not easily discerned in the landscape, creating an impediment to successfully and accurately interpreting the Vicksburg story to the public.

Historic Resources

"Historic properties," as defined by the implementing regulations of the NHPA (36 CFR 800), are any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the NRHP. This term includes artifacts, records, and the remains that are related to and located within such properties, as well as traditional and culturally significant Native American sites and historic landscapes. The term "eligible for inclusion in the National Register" includes both properties formally determined eligible and all other properties that meet NRHP listing criteria.

Vicksburg NMP has an extensive collection of historic structures and objects, including one of the more densely monumented battlefields in the world, with more than 1,340 monuments, markers, tablets, and plaques dotting the historic landscape. In addition to the largest collection of outdoor sculptures in the southeastern United States, the park also preserves 8historic fortifications; over 20 miles of reconstructed trenches, approaches, and parallels; 9 historic bridges; 5 historic buildings (including 1 antebellum home); 149 cannon and carriages; the ironclad *USS Cairo* gunboat; and Vicksburg National Cemetery (NPS, 2008b).

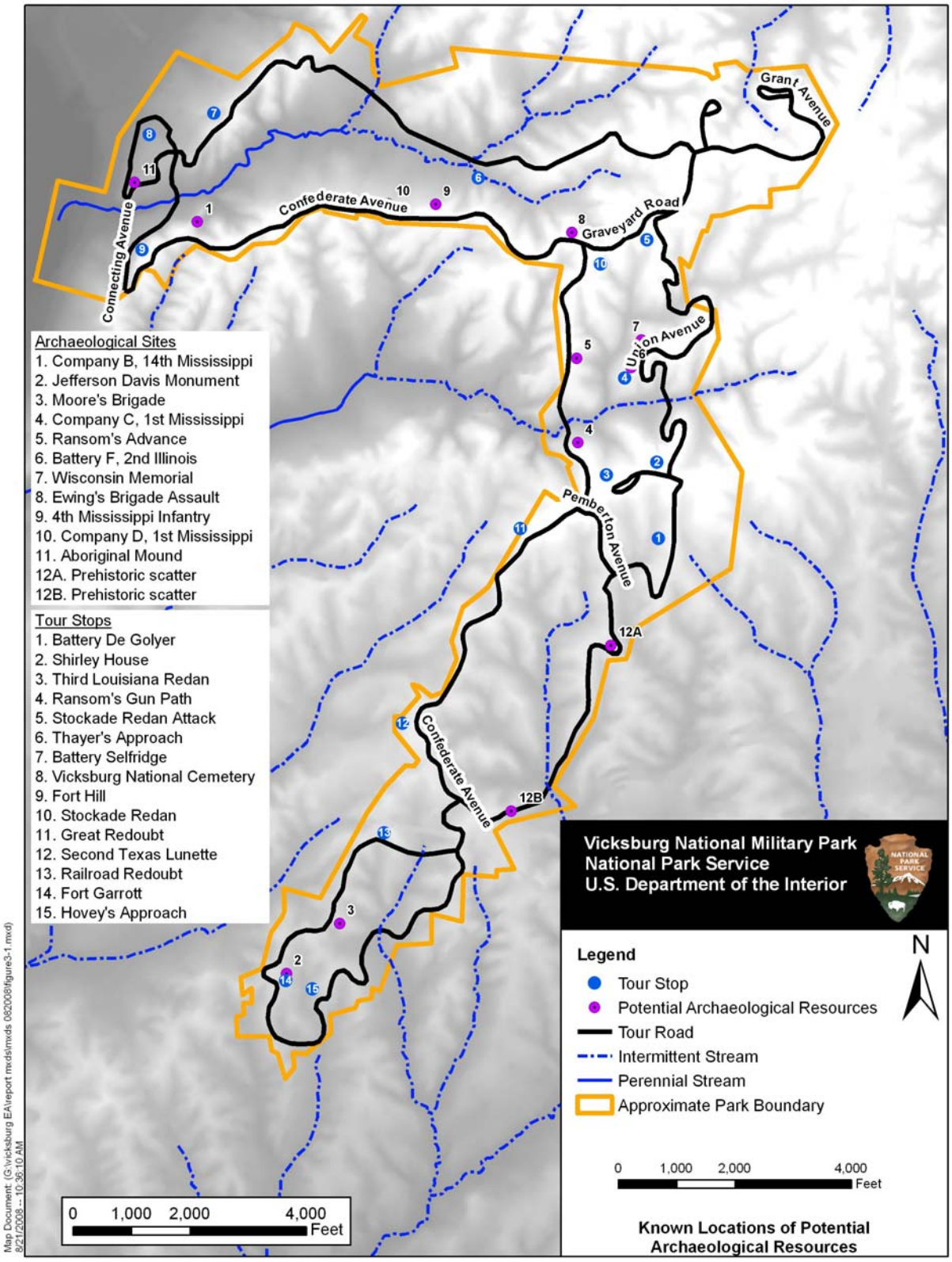
Archeological Resources

Vicksburg NMP is listed in its entirety on the NRHP. All archeological sites located within the area are protected under this listing (NPS, 1979). However, a formal comprehensive archeological survey, conducted to determine whether a site independently qualifies for the NRHP, has not been undertaken because any testing, excavations, or investigations would be destructive to values that might exist (NPS, 1979).

Archeological studies within Vicksburg NMP have been generally limited to areas of proposed park construction activities, including proposed roadways, a walking trail, and other amenities. A total of 14 archeological sites had been recorded within Vicksburg NMP (Mayr, 2009). Eleven of these sites are described in a 1999 inventory and reporting document for work at Mint Spring (Cliff and Buysse, 1999) (Figure 3-1). These include a potential aboriginal mound north of Mint Spring Bayou (Site 22Wr503) that has been the subject of several inconclusive investigations regarding its prehistoric significance. Additionally, nine prehistoric sites and one historic Civil War-era site were identified in Vicksburg NMP during a 1975 archeological site survey for a proposed walking trail, and in the *USS Cairo* walking area. In addition to the 11 sites described in the Mint Spring document, 2 sites were identified in 1997, one near the Memorial Arch and the other north of the Minnesota Monument inside a sharp bend of Union Avenue, by an archeologist working for Vicksburg NMP on a volunteer basis (NPS, 1998). A 14th site is located in the vicinity of Pemberton's Headquarters (Mayr, 2009).

An archeological and historical inventory was completed in 1999 for the Mint Spring Bayou stabilization project adjacent to Vicksburg National Cemetery. Two archeological sites with historic artifacts were identified, but neither site was recommended as eligible for listing on the NRHP.

Figure 3-1 Known Locations of Potential Archeological Resources



A metal-detecting survey of 10 acres in the Railroad Redoubt area was conducted in 2004 prior to clearing activity. Numerous Civil War-era artifacts, consisting mostly of three-ring minie balls, were recovered during this survey. The report recommended that an archeologist be on-site during clearing activities to oversee any potential discoveries during construction (NPS, 2004). Based on the results of the tree-clearing activities, no additional archeological resources were reported.

The archeological resources left from the Civil War do not shed much light on the understanding of the siege and defense of Vicksburg. Vast quantities of bullets, shell fragments, artillery projectiles, and an array of accouterments and other items were deposited on the battlefield during the battle at Vicksburg NMP. Union occupation forces policed the field and recovered usable items in the aftermath of the siege, leaving behind mostly fired or dropped bullets; shell fragments of various sizes; and broken or damaged weapons such as rifles, swords, and bayonets. Farmers plowed the area for the next 30 years and carted off wagonloads of items uncovered in the fields (T. Winschel, personal communication, 2008).

Many of the archeological resources that existed in the park were disturbed by CCC during its tenure in the park from 1933 to 1941. For approximately eight years, CCC used heavy equipment and hand tools to reshape slopes and ridges in the park to remove eroded features and prevent future erosion. Truckloads of items left from the siege were carted off by CCC. The items left behind are very much in a disturbed state.

NATURAL RESOURCES

Soils and Geologic Hazards

Vicksburg NMP is part of the loess hills physiographic province, which is an area characterized by steep hills and bluffs rising abruptly from the adjacent Mississippi River alluvial plain. These hills and bluffs range from 75 to 125 feet high and are 10 to 25 miles wide. This region contains the thickest deposits of loess soil in the Tennessee-Mississippi-Louisiana area (USDA, 1964; Walker, 2008).

The park lies within the 10-mile-wide belt of hilly land that borders the eastern escarpment of the Mississippi River alluvial valley. Loess is a wind-deposited material comprised of mainly silt with some fine sand and clay that forms layers ranging from 3 to 200 feet thick. The loess originated as ground-up sediment deposited in the Mississippi floodplain by retreating glaciers during the late Pleistocene epoch. Westerly winds picked up and deposited the fine sediment on the uplands just east of the floodplain. The loess layer is thickest near the bluff edges and thins sharply as one moves eastward.

Loess is a yellowish-buff colored soil and is very fertile because it is a product of mechanical disintegration rather than chemical decomposition, so most of its nutrients are readily available for plant consumption. When found on slopes, loess erodes easily. On grades over 12 percent, this propensity to erode becomes severe. Gullying is common on the steeper slopes but can be ameliorated by a perennial ground cover to prevent erosion. Loess possesses the unique characteristic of being able to stand in nearly vertical cliffs. Although it will stand in sharp cliffs for a long period of time, it is highly erodible if the surface is disturbed in any other manner and not followed by suitable soil stabilization. It was this erosion over time that caused the formation of the hills and deep valleys in the Vicksburg area, resulting in a natural fortress for the Confederate defenders (NPS, 2004).

The park's loess bluffs are underlain by fossiliferous limestone, a byproduct of sedimentation that occurred during the late Mesozoic period when the Gulf reached much farther north and covered a large portion of the southern United States, including current-day Vicksburg. The calcareous shells of marine invertebrates, ground into fragments, form the basis of limestone and shell marl. Mint Spring Bayou is one of the few areas of the park where bedrock is exposed; here, the substrate contains a large number of

fossils from the middle Oligocene (approximately 28 to 32 million years old) Byram Formation. Fossils have been collected from the Mint Spring area for more than 100 years, and many museums have collections of Vicksburg-area fossils. The lower Oligocene Vicksburg Group is a globally significant assemblage of highly fossiliferous marine sand, clay, and limestone units that record the paleoecological, spatial, and faunal evolution of the Gulf of Mexico as sea levels rose and fell. Other exposures of this formation are known in the southeastern states, but those in the vicinity of the park are exceptional and contain very well-preserved lower Oligocene marine fauna. In addition to approximately 150 species of invertebrates, the formation has yielded fish otoliths (ear bones); shark teeth and ray plates; marine mammal material; and even bones of terrestrial rhinoceros and amynodont (perrisodactyl), which were likely washed into the marine sediments (Kenworthy *et al.*, 2007).

Also during the 1999 Mint Spring Bayou stabilization project fieldwork, two areas of exposed fossiliferous bedrock were identified. As described by Cliff and Buysse (1999), "the fossil bed associated with the Mint Spring Formation is very significant as a paleontological resource." Current NPS policy would protect fossils on NPS land and allow scientific collection of the fossils during construction to mitigate for any impacts on fossils from construction activity.

The project area is located in a seismic area of 4 percent acceleration due to gravity. Areas over 3 percent have some risk of seismic activity.

Air Quality and Temperature

Air quality became a national concern in the mid-1960s, leading to the passage of the Air Quality Act (AQA) in 1967. The AQA, which is now referred to as the "Clean Air Act (CAA)," and subsequent amendments, have established procedures for improving conditions, including a set of NAAQS.

Historically, the park's air quality has been considered excellent (NPS, 2003). However, air quality is a concern due to the park's proximity to the City of Vicksburg. The park is located within a developed area that supports industry. Several major sources of air pollution (sources that emit more than 100 tons per year of one or more regulated pollutants) are located near the park (NPS, 2003). These include various industries, power plants, agricultural operations, and motor vehicles. Sources of air pollution within the park are motor vehicles and park maintenance activities such as mowing and controlled burns.

Under the terms of the 1990 CAA amendments, the park is designated as a Class II quality area (NPS, 2003). By definition, Class II areas of the country are set aside under the CAA but identified for somewhat less stringent protection from air pollution damage than Class I areas. The primary means by which the protection and enhancement of air quality are accomplished are through implementation of NAAQS. These standards address six pollutants known to harm human health: ozone, carbon monoxide, particulate matter, sulfur dioxide, lead, and nitrogen oxides (USDA, 2000a, as cited in NPS, 2003).

In 1997, USEPA established the 8-hour ground-level ozone standard at 0.08 ppm. Under this standard, USEPA can designate an area as "nonattainment" if it has violated the 8-hour ozone standard. USEPA may also designate an area as "attainment/unclassifiable," which is an area where monitored air quality data show either that the area has not violated the ozone standard over a three-year period or that there is not enough information to determine the air quality in the area. The entire state of Mississippi is designated as an attainment area (USEPA, 2008a). Madison Parish, Louisiana, is adjacent to Warren County, Mississippi, to the west and is also designated as an attainment area (USEPA, 2008b). The 0.08-ppm ozone standard was not implemented until 2004 because of lawsuits and court rulings. In 2004, all counties in Mississippi where ozone ambient air monitoring occurred were designated by USEPA as attaining these standards based on 2001-03 air monitoring data (MDEQ, 2007a).

Ozone was monitored in Vicksburg in 2001 and 2003. The measured daily maximum 8-hour average concentration was 0.077 ppm in 2001, 0.074 ppm in 2002, and 0.078 ppm in 2003. Vicksburg has not been included as a monitoring station for ozone since 2003. MDEQ currently monitors eight locations in eight counties for ozone, focusing on the population centers of Jackson, Tupelo, the Gulf Coast, and DeSoto County. The monitoring station in Jackson, Hinds County, had measured daily maximum 8-hour average concentrations of 0.069 ppm in 2004 and 2005, 0.072 ppm in 2006, and 0.073 ppm in 2007 (MDEQ, 2007b).

The mixed use development area in which the park is located could result in increased temperatures within the park. Heat islands form as cities replace natural landcover with pavement, buildings, and other infrastructure. They result in urban and suburban temperatures that are 2º Fahrenheit (F) to 10ºF hotter than nearby rural areas. Elevated temperatures can impact communities by increasing peak energy demand, air conditioning costs, air pollution levels, and heat-related illness and mortality (USEPA, 2008c).

Surface Water Quality and Streamflow Characteristics

The principal water body associated with Vicksburg NMP is the Yazoo River Diversion Canal, which flows in a former riverbed of the Mississippi River. The Yazoo River Diversion Canal runs adjacent to a roughly 0.5-mile section of the northwestern corner of the park. There are two bayous[1], a 20-acre bottomland hardwood forest, and at least two streams that qualify as wetlands. Several bayou tributaries and intermittent streams exist within the park as well. Of the major watercourses, only one, Mint Spring Bayou, exists entirely within the park. The others either originate in the park and flow onto adjacent land, or transverse the park and are subject to the impacts of contamination originating upstream from park boundaries. NPS has monitored Mint Spring Bayou and Glass Bayou for temperature, dissolved oxygen, pH, and conductivity since 1995. No unusual environmental contamination of the bayous was detected relative to the variables being measured (NPS, 2004).

The park is crossed by three stream corridors – Glass Bayou, Mint Spring Bayou, and Durden Creek – as well as minor perennial and intermittent streams. All eventually empty into the Mississippi River. The park's drainages are fed by springs, which maintain a constant flow even though the speed and depth of the water vary during the year. Recently, increased sedimentation resulting from the runoff of nearby urban development (especially along Highway 61 east of the park) may have resulted in higher water temperatures in Glass and Mint Spring Bayous (NPS, 2009).

Mint Spring Bayou is generally a perennial stream that varies from a perennial flow in its lower portions to an intermittent stream in its upper reaches. The stream also changes in volume with the seasons and after heavy rain events, ranging in width from 12 to 15 feet and a depth of 0.7 to 1.1 feet.

Glass Bayou is a shallow perennial stream that is faster-moving, shallower, and narrower than Mint Spring Bayou. Both streams have worn steeply sloped ravines into the bluffs (Cooper *et al.*, 2004). It flows through an exposed cave passage for a short length.

Branches of Durden Creek, also known as "Big Bayou," extend through the South Loop portion of the park for approximately 500 feet. The stream corridor averages 3 feet wide. A portion has a culvert where it passes beneath the South Loop of the tour road. Clearing associated with the Railroad Redoubt

[1] "Bayou" is a term applied to many local water features in the lower Mississippi River basin and in the Gulf Coast region of the United States, especially Louisiana. Its general meaning is a creek or secondary watercourse that is a tributary to another body of water, especially a sluggish and stagnant stream that follows a winding course through alluvial lowlands, coastal swamps, or river deltas (Bates and Jackson, 1984).

"entailed removal of vast numbers of trees planted in the mid-1900s, and opened the landscape to more grassland and herbaceous plants. Two-mile Creek, a small branch of Durden Creek running below Railroad Redoubt, is also considered a vital wetland area, and is being maintained as a buffering area of the restoration process" (NPS, 2008c).

Wetlands

To comply with EO 11990 (*Protection of Wetlands*), Vicksburg NMP prepared a Wetland SOF for the proposed project. The purpose of the SOF is to present the rationale for undertaking a project with potential adverse impacts on wetlands and to document the anticipated effects. The SOF is included as Appendix D.

A wetland delineation of the park was completed by Mississippi State University in December 2007. Figure 1-4 shows the delineated wetlands and streams in Vicksburg NMP. Park wetlands were either riverine, unconsolidated bottom or streambed, or palustrine forested wetlands. Wetlands in the park are most commonly associated with slopes with seepage-saturated soils, gullies, ephemeral creek beds, and streams (Kovalenko and Dibble, 2007). These areas are generally located within the Two-mile Creek, Durden Creek, Glass Bayou, or Mint Spring Bayou watersheds, all of which are tributaries to the Mississippi River or the Yazoo River Diversion Canal. These wetland types are common throughout the park and in the surrounding region, and within the park, the wetland communities include areas dominated by Chinese privet (*Ligustrum sinense*).

Functionally, forested wetlands in the park are defined as seepage or slope wetlands, which are recharged from rainwater that percolates from higher elevations and contributes to seepage, subsurface, and sheet flows. According to disturbance-level criteria, seepage and riverine wetlands in the park were judged pristine to moderately disturbed (primarily by upstream modifications and invasive plants), and modified wetlands were judged severely disturbed (Kovalenko and Dibble, 2007). Forested wetlands of the park may play an important role in control of erosion and siltation. Dense growth of Chinese privet may compromise this role and wetland habitat functions. Observations indicated very sparse herb and other shrub cover and lack of extensive root systems in gullies overgrown with privet, whereas nearby areas dominated by native giant cane (*Arundinaria gigantea*) had a more extensive root system in the upper part of the soil (Kovalenko and Dibble, 2007).

Water retention by seepage wetlands is essential for streamflow maintenance and integrity of the overall watershed. Saturated soils were observed in the park up to two months after the last significant precipitation was recorded (Kovalenko and Dibble, 2007). It is also possible that seepage wetlands prevent the soil from extreme desiccation, which may lead to changes in soil structure; therefore, this type of wetland is important for maintaining soil integrity and reducing erosion (Kovalenko and Dibble, 2007).

Biological functions of wetlands in the park consist of maintenance of plant and animal communities and regional and landscape biodiversity. Various fish, macroinvertebrates, reptiles, and amphibians utilize the wetland and perennial stream habitats. Park wetlands have a relatively high habitat function. Vicksburg NMP contains one of the few remaining tracts of loess bluff hardwood forests on public land in the United States; therefore, some of the wetlands within the park support plant communities that are regionally rare. No rare, threatened, or endangered species are known to occur within the wetland areas. Some areas had lower habitat quality due to the presence of invasive species, especially English ivy and Chinese privet (Kovalenko and Dibble, 2007).

The educational function of the park wetlands is potentially high, since the area contains many trails intersecting high-quality, regionally unique habitats, and by virtue of it being a National Park (Kovalenko and Dibble, 2007).

Vegetation

In the early part of the 20th century to combat erosion, Vicksburg NMP was revegetated to allow forest to grow within the park's boundaries. Currently, approximately 70 percent of the park's approximately 1,800 acres is forested. The park's GMP (1980) acknowledges that although the parkland reflects a succession of clear cutting and farming dating back from the 18th century settlement, most of the cleared fields have since been revegetated and no longer represent the historic condition of the Vicksburg battlefield. The park's 1996 Resource Management Plan depicts a similar theme. The Resource Management Plan indicates that the vegetative cover has changed the 1863 appearance of the battlefield. Further, it states that the overgrown regions of the park do not reflect the accurate historic scene (NPS, 2004).

Appendix E shows the USGS landcover classification for Vicksburg NMP. Over 60 species of trees and shrubs have been identified throughout Vicksburg NMP, constituting most of the second-growth forest established in the 1930s by CCC. Native oaks (*Quercus* spp.), elms (*Ulmus* spp.), and walnuts and pecans (*Carya* spp.) began to populate the park ridgetops and boundary areas (NPS, 2008e). In areas with little maintenance or clearing, Vicksburg NMP is characterized by southern oak-hickory hardwood forest. Forests stands containing primarily sweet gum (*Liquidambar styraciflu*a) and black locust (*Robinia pseudoacacia*) are present throughout the park (NPS, 2004). Most species diversity is observed in disturbed areas, such as roadsides, lawns, mowed areas, and fields.

Other dominant tree species at the park are the southern red oak (*Quercus falcata*) and white oak (*Quercus alba*). Common overstory trees include the southern sugar maple (*Acer barbatum*), basswood (*Tilia americana*), black oak (*Quercus velutina*), and northern red oak (*Quercus alba*). Common shrub and understory species include ironwood (*Carpinus caroliniana*), redbud (*Cercis canadensis*), pawpaw (*Asimina triloba*), dogwood (*Cornus florida*), sassafras (*Sassafras albidum*), oak-leaved hydrangea (*Hydrangea quercifolia*), and American hydrangea (*Hydrangea americana*). Herbaceous species commonly observed in the park's forested areas include Christmas fern (*Polystichum acrostichoides*), bedstraw (*Galium aparine*), green trillium (*Trillium viride*), and rattlesnake fern (*Botrychium virginianum*) (Walker, 2008).

Additional species are known to occur within the park although less commonly. The park is home to many wildflowers, ferns, and grasses, as well as several species of mushrooms and fungi. Over 200 species of wildflowers have been inventoried in the park, along with documentation regarding their historical value and uses (NPS, 2008f).

Plant species known to occur in the park's riparian areas include the localized spider brake fern (*Pteris multifida*) growing from the limestone rock face near the falls on Mint Spring Bayou; whorled marsh pennywort (*Hydrocotyle verticillata*); and swamp smartweed (*Polygonum hydropiperoides*) (NPS, 2008f).

Plant species known to occur in the park's cleared areas include southern grape fern (*Botrychium biternatum*), basket grass (*Oplismenus setarius*), purple top (*Tridens flavus*), and bushy bluestem (*Andropogon glomeratus*) (NPS, 2008f).

Some of the fungal forms found in the park include northern tooth fungus (*Climacodon septentrionale*), commonly found growing in deep woods, particularly on maple trees, and the stinkhorns (*i.e.*, *Mutinus elegans*), found buried in the leaf litter of the ravines. Giant puff balls (*Calvatia gigantea*) dot the open

areas below the Great Redoubt, while jelly fungi (*i.e.*, *Auricularia* sp.) can be seen on both decaying conifer and hardwood logs and stumps throughout the park (NPS, 2008f).

Specific information regarding the vegetation community in the proposed rehabilitation areas of each alternative is not available. Generally, the communities proposed to be rehabilitated include the cherrybark – water oak association, sweetgum – pecan tree – water oak association, tulip tree – oak association, and loblolly pine – planted association (Appendix E).

The vegetation communities in the cleared areas of the park include grassland alliance; kudzu vine shrubland association – treated; smooth sumac shrubland; isolated trees; and unclassified – scattered trees, vines, and shrubs (Appendix E). Bermuda grass, invasive species, wildflowers, sedges, and rushes are also known to occur in the cleared areas.

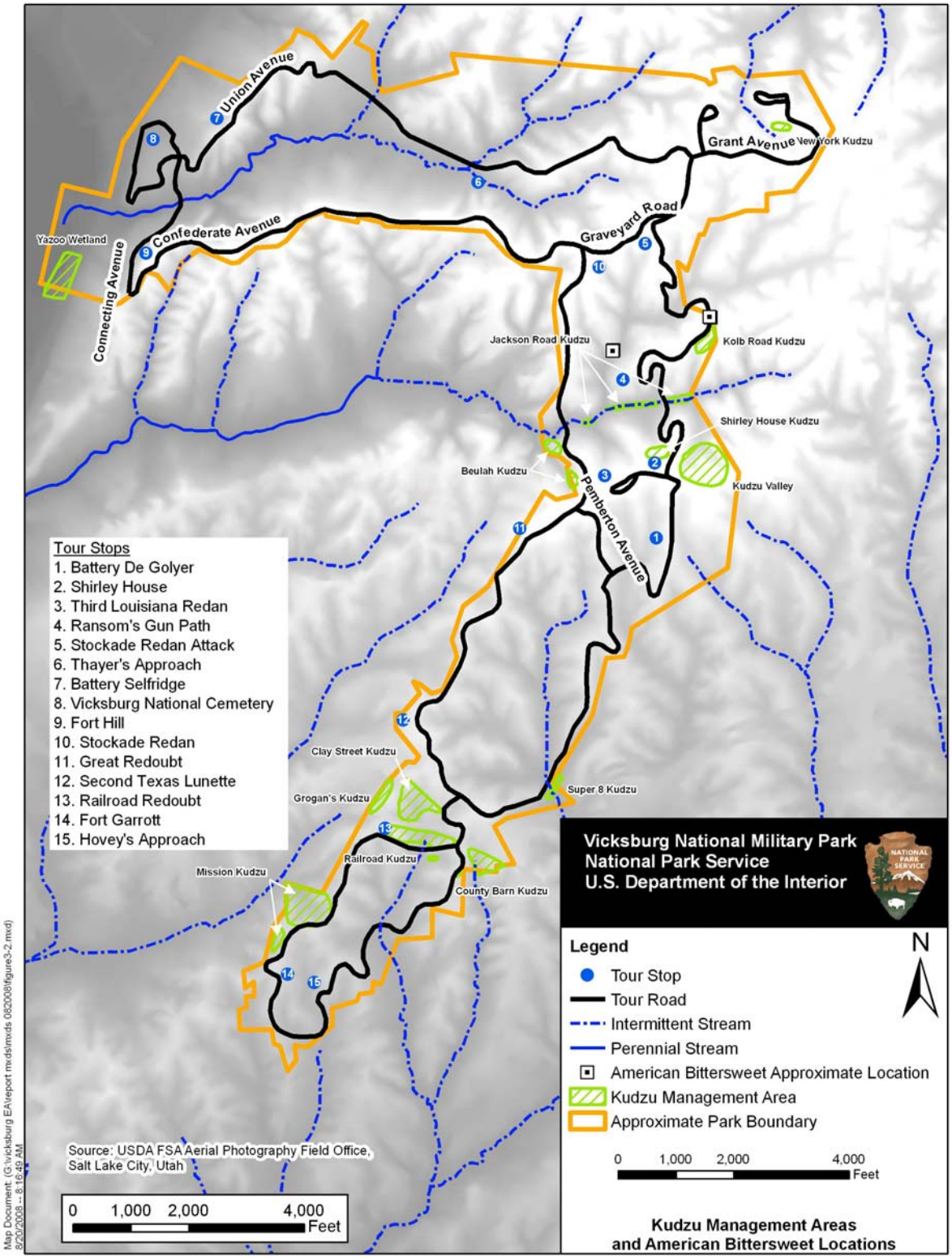
In addition to plant species native to the area, Vicksburg NMP also contains non-native, invasive plant species. Vicksburg NMP saw massive disturbance during the Civil War, as terrain was cleared for fields of fire and trees, shrubs, and cane were used for obstruction, shelter, protection, and fuel. In subsequent years, non-native plant species were introduced and became well-established residents of the park.

Within Vicksburg NMP, there are at least 83 invasive plant species. Five of these species pose the greatest threat to ecological processes: kudzu (*Pueraria lobata*), Johnson grass (*Sorghum halepense*), chinaberry (*Melia azedarach*), Chinese privet (*Ligustrum sinense*), and English ivy (*Hedera helix*). All are very difficult to control and have gained a toehold within the park's vegetation communities. Chinese privet occurs throughout the park, both adjacent to the park boundaries and within the interior. Chinaberry and mimosa (*Albizia julibrissin*) trees occur all along the park boundaries. Chinese parasol trees occur predominantly in the South Loop buffer areas. Johnson grass dominates at Fort Hill.

Paper mulberry (*Broussonetia papyrifera*), Chinese parasol tree (*Firmiana simplex*), Japanese honeysuckle (*Lonicera japonica*), heavenly bamboo (*Nandina domestica*), and trifoliate orange (*Poncirus trifoliata*) are also problematic for park management (NPS, 2009).

Invasive plant infestations are currently monitored under the park's invasive plant management plan (NPS, 2004, 2008e). Vicksburg NMP's natural resource program focuses heavily on managing invasive species and on improving the park's ecological integrity. The percentage of the park that is covered by invasive species is not available. The kudzu population is being aggressively treated by the park at 13 locations initially totaling approximately 25 acres (Figure 3-2). Kudzu is a perennial, trailing, or climbing vine of the legume family, and during the growing season, this prolific plant can grow at a rate of a foot per day, easily covering and shading out trees and understory vegetation. The kudzu population is being managed by a long-term program of repeatedly treating the leaves and stems of the plants with approved herbicides in an attempt to eradicate the plant from the area. Current observations (2008) indicate the program has successfully lowered the kudzu coverage from 25 acres to 10 acres. At least 2 treatments per year over a 5- to 10-year period are anticipated by the park's Natural Resources Program Manager for continued control (NPS, 2009).

Figure 3-2 Kudzu Management Areas and American Bittersweet Locations



Unique or Important Wildlife or Wildlife Habitat

Vicksburg NMP contains excellent habitat for many species of birds and mammals. Trees planted in the park during the 1930s are today home to many mammal species (NPS, 2008d; Keiser, 2002; Linehan and Mengak, 2006; Somershoe *et al.*, 2004). Various wildlife resources inhabit the mixed hardwood (oak species-dominated), mesophytic forests and grasslands of Vicksburg NMP, which is typical of the southeastern United States. The increase of plant growth since the 1930s has supported the return of many species of native fauna. These include ungulates, small mammals, birds, reptiles, amphibians, and invertebrates. Appendix F presents the wildlife known to occur in the park and their preferred park habitats.

In addition to the species listed in Appendix F, the streams in the park provide habitat for crayfish (*e.g.*, Glass Bayou) and freshwater snails. Invertebrates known to occur in the park include beetles, butterflies, moths, damselflies, dragonflies, backswimmers, water boatmen, springtails, mayflies, midges, mosquitoes, caddisflies, ants (including invasive fire ants), and many others.

Wildlife in the park uses forested habitat for the food and shelter it provides. Forest species are reliant upon woodland resources to survive and successfully reproduce, and will use every available ecological niche until the carrying capacity of a particular habitat is reached. Forested habitats with structural and compositional heterogeneity provide for microhabitats and food sources that support species diversity. A maintained grassland area consisting of one grass species is a monoculture and not very biologically productive, and cannot be expected to support very many species.

Vicksburg NMP encompasses one of the few extant tracts of loess bluff hardwood forest on public land in the United States. This loess hill ecosystem borders the eastern edge of the lower Mississippi River Valley from Cairo, Illinois, to Baton Rouge, Louisiana. The loess soils at the western edge of this ecosystem support unique hardwood forests. These forests provide a transition area between the moist bottomland hardwood forests within the Mississippi River floodplain and the more well-drained upland pine forests of the east gulf coastal plain. Loess bluff hardwood forest has become increasingly fragmented by development and other land uses over the years (NPS, 2004).

Species of Concern

USFWS and the Mississippi Natural Heritage Program (MNHP) were contacted to determine whether any known critical habitats or listed rare, threatened, or endangered species or species of concern have been documented on or adjacent to the project area. USFWS indicated that there are no records of any federally listed rare, threatened, or endangered species or species of concern within the project area (USFWS, 2007; Appendix A).

There are no known federally listed wildlife species that reside within the park, although one delisted but monitored bird species (bald eagle [*Haliaeetus leucocephalus*]) and one federally endangered bird species (interior least tern [*Sternaantillarum athalassos*]) use and may use, respectively, the park on a transitory basis. The bald eagle has been observed near Fort Hill, which is situated on high bluffs above the Yazoo River Diversion Canal. The Yazoo River and its adjoining Louisiana bayous provide an abundant source of favored prey for the bald eagle (NPS, 2004).

There are two state animal species of concern that reside in the park. These are the Mississippi map turtle (*Graptemys pseudogeographica*) and the alligator snapping turtle (*Macrochelys temminckii*). There is also one state species of concern that is known to inhabit Warren County (the Oldfield mouse [*Peromyscus polionotus*]), but was not found during the park's mammal inventory completed in 2006 (Linehan and Mengak, 2006). According to MNHP records, the southern red belly dace (*Phoxinus*

erythrogaster) is a state fish species of concern found within a 2-mile radius of the project area. The park staff indicated that the southern redbelly dace is not listed on the park's inventory (V. DuBowy, personal communication, 2008).

Based upon information received from MNHP, there are two state imperiled plant species (because of extreme rarity) that are located approximately within a 2-mile buffer of the park. These two plant species are the erect burhead (*Echinodorus rostratus*) and the prairie nymph (*Herbertia lahue* ssp. *caerulea*). Neither the erect burhead nor the prairie nymph is listed on the park's inventory. Though not listed in the park inventory, the prairie nymph is locally abundant within the park. The prairie nymph occurs in large open areas along the tour road during springtime. The park will be monitoring for this spring-blooming plant within the existing cleared areas in the spring. American bittersweet (*Celastrus scandens*) is listed by MNHP as a species of special concern (MNHP, 2006) and was observed in the park in April 2008 in two locations (Figure 3-2) (V. DuBowy, personal communication, 2008). Typical American bittersweet habitat includes forests, edges of forests, fields, thickets, and swamps or damp forests.

In Mississippi, plants receive no formal protection by state law other than provided for in trespass laws. NPS will inventory, monitor, and manage state and locally listed species in a manner similar to its treatment of federally listed species to the greatest extent possible. NPS will determine all management actions for the protection and perpetuation of federally, state, or locally listed species throughout the park management planning process, and will include consultation with lead federal and state agencies as appropriate (NPS, 2006).

NPS Operations and Facilities

Long-term Management and Sustainability of Resources

Approximately 550 acres of the park is currently kept in a mowed, "park-like" condition. The park contains a 16-mile tour road, a 12-mile primitive hiking trail, an antebellum home, more than 1,340 monuments and markers, a restored Civil War gunboat, a Visitor Center, a museum, 2 residences, and a national cemetery. According to Vicksburg NMP records, 555,108 people visited the park in 2008. Park operations are managed to protect the park's cultural, natural, and recreational resources, and to interpret these resources to the visiting public while providing for public safety and service.

NPS administrative offices are located in the Visitor Center. Office space is also associated with the archival storage facility located behind the *USS Cairo* Museum, and the museum itself (NPS, 2009). Most of the park's maintenance facilities are located in the maintenance complex to the rear of the Visitor Center. There are also some storage and repair facilities behind the *USS Cairo* Museum, along with the archival storage area (NPS, 2009).

Vicksburg NMP is organized into an Administrative Division, an Operations Division, and a Maintenance Division, and employs 42 people. The Operations Division includes the most diverse array of specialties, including visitor and resource protection, interpretation, natural resource management, fee management, museum curation, and cultural resource management. The Maintenance Division is the most visible to the visiting public, as its personnel must constantly attend to the upkeep of the cultural landscape. Maintaining historic cleared vistas as they are now requires a major input of time, funding, and energy on the part of park operations (NPS, 2004).

4. ENVIRONMENTAL CONSEQUENCES

4. ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

The following discussion describes the environmental consequences associated with the no action alternative (Alternative A) and with the implementation of Alternatives B, C, and D. This section also provides the scientific and analytical basis for comparing the alternatives. Each alternative is organized by impact topics, which refine the issues and concerns into distinct topics for analysis. These topics allow a standardized comparison between the alternatives based on their impact on the environment.

Generally, the methodology for resource impact assessments follows direction provided in the *CEQ Regulations for Implementing Parts 1502 and 1508* of NEPA. The standard and baseline for assessing and measuring impacts is change relative to the conditions that existed before the passage of NEPA in 1969.

The impact analysis and the conclusions in this section are based largely on a review of existing literature and park studies; information provided by experts within NPS, USFWS, the Mississippi Department of Archives and History (SHPO), and other agencies; and the observations and professional judgments of park staff.

IMPACT TOPIC THRESHOLD DEFINITIONS

The terms of potential impacts are described as follows:

- Type – Are the impacts beneficial or adverse?
- Context – Are the impacts site-specific, local, or regional?
- Duration – Are the impacts short-term (*e.g.*, lasting less than one year) or long-term (*e.g.*, lasting more than one year)?
- Intensity – Are the impacts negligible, minor, moderate, or major?

Specific impact definitions apply to each of the impact topics addressed in this EA. The definitions are defined in terms of intensity (negligible, minor, moderate, and major) and duration (short-term and long-term). Detailed descriptions of each impact definition as it relates to its corresponding impact topic are presented in Appendix G.

Both beneficial and adverse impacts are discussed. The CEQ regulations and NPS's *Conservation Planning, Environmental Impact Analysis and Decision-making* (DO-12) (NPS, 2005) call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact (*e.g.*, reducing the intensity of an impact from major to moderate or minor). The alternatives assume that park managers would apply mitigation measures to reduce or avoid impacts. Without appropriate mitigation measures, the potential for resource impacts would increase and the magnitude of those impacts would rise.

IMPACT ASSESSMENT FOR CULTURAL RESOURCES

In this EA, impacts on cultural resources (archeological resources, historic structures, and the cultural landscape) are described in terms of type, context, duration, and intensity, which is consistent with the CEQ regulations. These impact analyses are intended, however, to comply with the requirements of both NEPA and Section 106 of the NHPA.

In accordance with ACHP's regulations implementing Section 106 (36 CFR 800, "Protection of Historic Properties"), impacts on cultural resources were identified and evaluated by determining the areas of potential effect (APEs); identifying cultural resources in the APEs that were either listed on or eligible to be listed on the NRHP; applying the criteria of adverse effect on affected cultural resources either listed on or eligible to be listed on the NRHP; and considering ways to avoid, reduce, or mitigate adverse effects.

Under ACHP's regulations, a determination of either *adverse effect* or *no adverse effect* must be made for affected, NRHP-eligible cultural resources. An *adverse effect* occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion on the NRHP (*e.g.*, diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association). Adverse effects also include reasonably foreseeable effects caused by the preferred alternative that would occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5, "Assessment of Adverse Effects"). A determination of *no adverse effect* means there is an effect, but the effect would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion on the NRHP.

CEQ regulations and DO-12 also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact (*e.g.*, reducing the intensity of an impact from major to moderate or minor). Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation only under NEPA. It does not suggest that the level of effect as defined by Section 106 is similarly reduced. Although adverse effects under Section 106 may be mitigated, the effect remains adverse.

A Section 106 summary is included in the impact analysis section for the Preferred Alternative. This summary is intended to meet the requirements of Section 106 and is an assessment of the effect of the undertaking (implementation of the Preferred Alternative) on cultural resources, based on the criterion of effect and criteria of adverse effect found in the regulations of ACHP.

IMPAIRMENT ANALYSIS METHOD

In addition to determining the environmental consequences of the Preferred Alternative and other alternatives, the *NPS Management Policies* (NPS, 2006) and DO-12 require analysis of potential effects to determine whether actions would impair park resources.

The fundamental purpose of NPS, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to promote and regulate so as to conserve park resources and values. NPS managers must always seek ways to avoid or reduce to the greatest degree practicable adverse effects on park resources and values. However, the laws give NPS management discretion to allow effects on park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given NPS management discretion to allow certain effects within parks, that discretion is limited by statutory requirement that NPS must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an effect that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including opportunities that otherwise would be present for the enjoyment of those resources or values. An impact would more likely constitute impairment to the extent it affects a resource or value whose conservation is one of the following:

- Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park

- Key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park
- Identified as a goal in the park's Master Plan or GMP or other relevant NPS planning documents

Impairment may result from NPS activities in managing the park; from visitor activities; or from activities undertaken by concessionaires, contractors, and others operating in the park. A determination of impairment is made for each natural and cultural resource impact topic analyzed in this section of the document. As required by NPS guidelines, an assessment of the potential for impairment is provided in situations where moderate or greater intensity of effects on natural or cultural resources is predicted.

Overall, landscape treatments would have both positive and negative, minor to moderate effects on the general environment of Vicksburg NMP. Discussion and assessment of these effects are provided in the following sections.

ALTERNATIVE A – CONTINUE EXISTING MANAGEMENT (NO ACTION)

Alternative A would continue the current management operations and conditions. Each impact topic and the summary of impacts from this alternative are described below.

Recreational Resources, Aesthetics, and Visitor Experience

Recreational Resources

Alternative A would not cause any changes to existing recreational resources or uses in the park. Park visitors would still be able to participate in walking, biking, hiking, and other recreational activities. Park attendance and availability of recreational resources would not change if this alternative were implemented.

Aesthetics

The impacts on aesthetics associated with this alternative would largely depend on whether the visitor views the park as primarily a "cultural," "natural," or "recreational" site. The park contains many types of resources, and people tend to value different resources with varying degrees of intensity depending on individual preference. The beneficial and adverse impacts would be highly subjective depending on the individual visitor's opinions.

Continuing existing management would result in minor long-term adverse impacts on visitors interested in historic interpretation. In many locations, woodland cover occupying ravines currently blocks views associated with the historic field of fire of artillery pieces, or visual connections that existed between opposing fortification systems. These existing forest stands would mature and expand as a result of the no action alternative. The matured forests would further prevent viewing of the battlefields and give a false impression to visitors of the battlefield terrain during the time of the Civil War. Visitors interested in recreational activities or the natural environment would not experience changes in park aesthetics, as the current features of the park would be maintained.

Visitor Use and Experience

As noted in the discussion on aesthetics, the impacts on visitor use and experience associated with this alternative would largely depend on whether the visitor views the park as primarily a "cultural," "natural," or "recreational" site. The visitor experience of someone who is interested in historical

interpretation may differ drastically from that of someone who is interested in viewing wildlife and enjoying the natural environment.

Continuing existing management would result in minor long-term adverse impacts on visitors interested in historic interpretation because visitors have limited opportunities to understand and visualize the campaign. Visitors coming to the park for reasons of historic interpretation would continue to have that experience negatively impacted over the long-term. This would be especially true for those who realize or are aware that the condition of the battlefield has changed dramatically over the years and no longer resembles the landscape that existed in 1863. No impacts would occur on visitors using the park for recreation or enjoying nature if existing management were to continue. No changes to the park's recreational or natural features would occur.

Cultural Resources

Cultural Landscape

Continuing existing management would result in negligible to minor long-term adverse impacts on cultural landscapes as existing forest stands mature and expand, preventing viewing of the battlefields. The second-growth woody vegetation would continue to mask the landscape features (the markers, monuments, trench lines, and natural ravines). Soil erosion would continue to occur unabated and undetected, resulting in further deterioration of the cultural landscape. The interpretive potential of a cleared landscape to illuminate history would not be realized, resulting in a reduced understanding of the siege of Vicksburg on the part of the visiting public. Also, the park would be less able to meet its legislated goal of restoring the battlefield to a semblance of its wartime appearance.

Impacts from actions contained in this alternative would not result in impairment of the cultural landscape of the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Historic Resources

Continuing existing management would result in negligible long-term impacts on historic resources. The existing management at Vicksburg NMP related to historic resources would be maintained.

Impacts from actions contained in this alternative would not result in impairment of historic resources in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Archeological Resources

Continuing existing management would result in negligible long-term adverse impacts on archeological resources. Ongoing erosion of loess soils in wooded areas may impact unknown archeological resources, but the likelihood of significant detrimental impacts on archeological resources is very low.

Impacts from actions contained in this alternative would not result in impairment of archeological resources in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Natural Resources

Soils and Geologic Hazards

Continuing existing management would result in minor long-term adverse impacts on soils and geologic hazards from existing erosion problems. Loess soil is highly erodible, even within the context of a heavily forested landscape. Modern sod-forming grasses with fibrous root systems have been planted in other areas of the park. These areas have had their erosion rates severely reduced. Alternative A would result in the natural process of erosion continuing to adversely impact the cultural landscape in the park.

Impacts from actions contained in this alternative would not result in impairment of soils and geologic resources in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Air Quality and Temperature

Continuing existing management would result in negligible long-term impacts on air quality. Impacts on air quality would be negligible because no new management would be implemented. Any impact on air quality would be slight and short-term, and air quality would be expected to return to pre-existing conditions shortly after the alternative has been implemented.

Impacts from actions contained in this alternative would not result in impairment of air resources in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Surface Water Quality and Streamflow Characteristics

Continuing existing management would result in negligible long-term impacts on water quality and quantity. The streams within the park would continue to receive abundant shade and organic material from the overhanging vegetative canopies. No land clearing would occur. A USACE 404 permit would not be necessary. MDEQ would not require the drafting of a SWPPP, which it otherwise would if any clearing adjacent to streams were to take place.

Impacts from actions contained in this alternative would not result in impairment of water resources in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Wetlands

Continuing existing management would result in negligible long-term impacts on wetlands. Construction-related land disturbance or fill would not occur. However, the wetlands may continue to be impacted due to the current erosion and sedimentation.

Impacts from actions contained in this alternative would not result in impairment of wetland resources in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Vegetation

Continuing existing management would result in negligible to minor long-term impacts on vegetation. The most significant change to the plant community structure in recent years has been the encroachment

of invasive species. Park management works aggressively to contain and eliminate these botanical infestations, particularly kudzu, which spreads prolifically. However, the current management of invasive species is limited to specific areas of the park. Alternative A would result in the continuation of current management actions and allow the eventual regrowth of a native plant community in areas of former infestation. Invasive species would be expected to increase in population and coverage in areas not currently managed for invasive species control. These impacts may occasionally affect individual native plants, but measurable or perceptible changes in plant community size, integrity, or continuity would not occur.

Continuing the existing management would result in negligible to minor long-term adverse impacts because invasive species would continue to expand within park property. The most significant change to the plant community structure in recent years has been the encroachment of invasive species. Park management works aggressively to contain and eliminate these botanical infestations, particularly kudzu, which spreads prolifically. Alternative A would result in the continuation of these management actions and allow the eventual regrowth of a native plant community in areas of former infestation. These impacts may occasionally impact individual native plants, but measurable or perceptible changes in plant community size, integrity, or continuity would not occur.

Impacts from actions contained in this alternative would not result in impairment of vegetation resources in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Wildlife and Habitat

Continuing the existing management would result in negligible long-term impacts on locally sensitive species and habitat. The forested areas of the park provide habitat for a variety of woodland species. Leaving this land as it is would have no discernable impact on the resident fauna since conditions would not be changing.

Impacts from actions contained in this alternative would not result in impairment of wildlife resources and habitat in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Species of Concern

Continuing existing management would result in negligible long-term impacts on protected species. The impacts on species of concern as a result of Alternative A would be at or below the level of detection and would not be measurable or of perceptible consequence to populations.

Impacts from actions contained in this alternative would not result in impairment of species of concern in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

NPS Operations and Facilities

Long-term Management and Sustainability of Resources

Continuing existing management would result in negligible long-term impacts on park operations. This alternative would not result in any additional facilities to maintain or acreage being added to the workload of the maintenance staff. At current funding, staffing, and equipment levels, the Maintenance Division is challenged to maintain the existing cleared areas in the park.

From a law enforcement perspective, heavily wooded areas tend to deter artifact hunters due to the presence of insects, snakes, and tangled vegetation. Most artifact hunters operate in mowed areas, though it should be noted that evidence of Archeological Resource and Protection Act violations is more difficult to detect in wooded areas because they are not often patrolled.

For natural resource management, keeping the current area of forest vegetation adds a slight amount to the management workload, because forested woodlands must be inventoried and monitored as well as managed for invasive species.

ALTERNATIVE B – PRESERVATION THROUGH BEST MANAGEMENT PRACTICES (BMPS)

Alternative B would preserve resources by applying BMPs to the park landscape and relying on interpretation to be the primary means of communicating site history to the park visitor. Each impact topic and the summary of impacts from this alternative are described below.

Recreational Resources, Aesthetics, and Visitor Experience

Recreational Resources

Alternative B would cause negligible short- and long-term beneficial impacts on recreational resources and uses in the park by the addition of amenities including additional benches and shade trees. These features would not interfere with current recreational activities, but would be a convenience to recreational users who could utilize the new amenities. Park visitors would still be able to participate in walking, biking, hiking, and other recreational activities. Park attendance and availability of recreational resources are not expected to change if this alternative were implemented.

Aesthetics

As with Alternative A, the impacts on aesthetics associated with this alternative would largely depend on whether the visitor views the park as primarily a “cultural,” “natural,” or “recreational” site. The park contains many types of resources, and people tend to value different resources with varying degrees of intensity depending on individual preference. The beneficial and adverse impacts would be highly subjective depending on the individual visitor’s opinions.

Implementation of Alternative B would result in minor long-term beneficial impacts on visitors interested in historic interpretation and negligible to minor long-term beneficial impacts on visitors using the park for recreation or enjoying nature. The aesthetic benefits of Alternative B would include the maintenance of current viewsheds, implementation of BMPs, and control of invasive species.

The three 10-acre sites where BMPs would be implemented would result in minor short-term adverse impacts during land disturbance activities on all visitors and negligible long-term beneficial impacts on all visitors. If the preferred aesthetic resource for a visitor is a natural wooded area, then a forest clearing may not be a pleasing aesthetic to that visitor, but the clearing would be more aesthetic than an actively eroding area. The sites where BMPs would be implemented would be limited in size and would be in areas where erosion is actively occurring.

The doubling of invasive alien plant species control efforts and privet eradication would result in minor short-term adverse impacts on all visitors during land disturbance, and negligible long-term beneficial impacts on all visitors from the removal of the invasive species.

The five new removable exhibits, Living History area improvements (shade trees and benches), CCC wayside, Shirley House landscape interpretation, and riverfront park interpretive information would result in minor short-term and long-term beneficial impacts on the park aesthetics for visitors interested in historic interpretation. Visitors interested in recreation activities or the natural environment would likely not note a change in aesthetics from these items, as the park already has a number of interpretive features. Aesthetic benefits to all park visitors would include the enhancement of visitor comfort from additional benches and shade trees. The additional exhibits within the park Visitor Center would likely not have an impact on the overall aesthetics of the park.

Visitor Use and Experience

As described in the aesthetics section, the impacts on visitor use and experience associated with this alternative would largely depend on whether the visitor views the park as primarily a "cultural," "natural," or "recreational" site. The visitor experience of someone who is interested in historical interpretation may differ drastically from that of someone who is interested in viewing wildlife and enjoying the natural environment.

Implementation of Alternative B would result in minor to moderate long-term beneficial impacts on visitors interested in historic interpretation. These beneficial impacts would be somewhat reduced by the presence of trees obscuring the view of the battlefield. The interpretation of the Vicksburg campaign would be expanded via exhibits, waysides, interpretive programs, and models. Visitors interested in historic interpretation would be able to use these features to understand and visualize the campaign. Interpretation would become the primary means for commemoration and communication of the site history to the visitor. There would be the potential to interpret and visualize the battle on-site in a way that would allow the visitor to mediate any differences between the landscape of today and the landscape at the time of the siege. Such tools could facilitate interpretation without having to faithfully recreate or represent historical conditions. Visitors using the park for recreation or enjoying nature would not be expected to fully appreciate the benefits from these interpretative elements.

Negligible short-term and long-term beneficial impacts would occur as a result of additional benches and shade trees to visitors using the park for recreation or enjoying nature if Alternative B were applied. These elements of Alternative B would enhance visitor comfort.

The three 10-acre sites where BMPs would be implemented would result in minor short-term adverse impacts during land disturbance activities on all visitors, negligible long-term beneficial impacts on visitors interested in historic interpretation or using the park for recreation, and negligible long-term adverse impacts on visitors enjoying nature. Also, the doubling of invasive alien plant species control efforts and privet eradication would result in minor short-term adverse impacts on all visitors during land disturbance activities, and negligible long-term beneficial impacts on all visitors from the removal of these species.

The relic hunting signage implemented by this alternative would not impact visitor use and experience.

Cultural Resources

Cultural Landscape

Alternative B would result in negligible to minor long-term beneficial impacts on cultural landscapes, as the establishment of turf and limited tree clearing in sites where BMPs would be implemented would preserve cultural landscape features. However, most of the forested areas would remain in second-growth woody vegetation, which would continue to mask the landscape features (the markers, monuments, trench

lines, and natural ravines). Soil erosion could continue to occur unabated and undetected outside the areas where BMPs would be implemented. The net result of BMP implementation to the overall cultural landscape at the park would be negligible to minor beneficial. The proposed alternative would have no adverse effect on NRHP-eligible cultural resources under Section 106 of the NHPA. The doubling of invasive plant species control efforts and privet eradication would result in negligible short-term and long-term beneficial impacts on the cultural landscape. These invasive plants obscure the terrain, so their removal would benefit the cultural landscape. However, these invasive species tend to be located along the park boundaries and in areas where forested woodlands occur, so the benefit of clearing the invasive species would occur in areas where there are few significant cultural landscape features or where the cultural landscape would continue to be obscured by native vegetation.

The Shirley House outdoor exhibit would result in minor short-term and long-term beneficial impacts as the cultural landscape during the Vicksburg siege is restored. Some negligible short-term and adverse impacts on the cultural landscape would be expected during construction, but these impacts would be temporary in nature and restored once construction was completed. Similarly, the five new removable exhibits would result in negligible short-term and long-term beneficial and adverse impacts on cultural landscapes.

The Living History area improvements (shade trees and benches), 10 benches with associated shade trees along pullouts, and CCC wayside could result in negligible short-term and long-term adverse impacts on cultural landscapes depending on their location within Vicksburg NMP. These elements are not historically accurate representations of the cultural landscape, and their inclusion may detract from the cultural landscape.

The high-tech interpretive programs, large-scale battlefield relief model, interpretive exhibits at riverfront park units, and relic-hunting signage would not result in impacts on cultural landscapes.

Impacts from actions contained in this alternative would not result in impairment of the cultural landscape of the park (see specific definition of “impairment” in the discussion of “Impairment Analysis Method” on page 4-2).

Historic Resources

Overall, implementation of Alternative B may result in negligible short-term adverse impacts on historic resources during implementation of some of the alternative components. The entire Vicksburg NMP is listed as a resource on the NRHP, so any activity with the resource has the potential to impact the NRHP-eligible resource. However, no long-term impacts would result if Alternative B were applied, because the focus on these improvements is to enhance the historic interpretation of Vicksburg NMP resources. The proposed alternative would have no adverse effect on NRHP-eligible cultural resources under Section 106 of the NHPA.

The five new removable exhibits, high-tech interpretive programs, large-scale battlefield relief model, interpretive exhibits at riverfront park units, and relic-hunting signage would not result in impacts on historic resources. The Living History area improvements (shade trees and benches), CCC wayside, and 10 benches in areas with shade trees along pull-outs would not result in impacts on historic resources, assuming the improvements do not directly impact a historic resource.

The three 10-acre sites where BMPs would be implemented, doubling of invasive alien plant species control efforts, and privet eradication would result in potential negligible short-term adverse impacts if areas were within the APE of significant historic resources at Vicksburg NMP. These impacts would be a

result of land- and brush-clearing activity, and would last only during the actual work activity. No long-term impacts on historic resources would be expected.

Similarly, the Shirley House outdoor exhibit would result in negligible short-term adverse impacts on historic resources from the presence of the non-historic exhibit. However, the long-term impact would be to enhance historic interpretation of the landscape around the Shirley House.

Impacts from actions contained in this alternative would not result in impairment of historic resources in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Archeological Resources

Alternative B would result in negligible long-term beneficial impacts on archeological resources from posting of additional signage to prevent relic hunting and from additional archeological surveys during land-clearing activities from implementation of BMPs. None of the proposed sites where BMPs would be implemented would be located near known archeological resources. The proposed alternative would have no adverse effect on NRHP-eligible cultural resources under Section 106 of the NHPA.

The five new removable exhibits, Shirley House outdoor exhibit, and interpretive exhibits at riverfront park units would not result in impacts on archeological resources, assuming there is no associated soil disturbance. The high-tech interpretive programs, large-scale battlefield relief model, and doubling of invasive alien plant species control efforts would not result in impacts on archeological resources.

The Living History area improvements (shade trees and benches) and 10 benches in areas with shade trees along pull-outs would result in potential negligible short-term adverse impacts from tree planting (assuming no significant archeological sites are disturbed), and no long-term impacts. Accordingly, the CCC wayside and three 10-acre sites where BMPs would be implemented would result in potential negligible short-term adverse impacts from ground disturbance (assuming no significant archeological sites are disturbed), and no long-term impacts.

Impacts from actions contained in this alternative would not result in impairment of archeological resources in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Natural Resources

Soils and Geologic Hazards

Soil erosion control as it relates to cultural resources and their connection to the natural terrain is the primary objective of Alternative B. Alternative B would result in negligible to minor long-term beneficial impacts on soils and geologic hazards due to the BMPs implemented to halt erosion. The BMP practices would be developed with the assistance of local experts to determine the most appropriate landcover for the park sites that are currently deteriorating due to erosion. The BMPs would focus on retaining the existing soil profile of the park, which represents the last aboveground evidence of the siege and the earthworks constructed by the opposing armies, and may protect surviving archeological evidence of the siege. BMPs would therefore focus primarily on soil erosion control to ensure the survival of extant evidence of the siege.

The 5 new removable exhibits, Living History area improvements (shade trees and benches), high-tech interpretive programs, large-scale battlefield relief model, Shirley House outdoor exhibit, interpretive

exhibits at riverfront park units, relic-hunting signage, and 10 benches in areas with shade trees along pull-outs would not result in impacts on soils and geologic hazards.

The CCC wayside and privet eradication would result in negligible short-term adverse impacts, assuming proper BMPs are followed, and no long-term impacts on soils and geologic hazards. Impacts on soils would be below or at the lower levels of detection. Any impacts on soil characteristics and erosion rates would be slight and would return to pre-existing conditions shortly after project implementation activities.

The three 10-acre sites where BMPs would be implemented would result in negligible short-term adverse impacts during construction, assuming proper BMPs are followed, and minor long-term beneficial impacts on soils and geologic hazards due to the reduction of erosion hazard in small areas.

Doubling of invasive alien plant species control efforts would result in negligible short-term adverse impacts during implementation, assuming proper BMPs are followed, and no long-term impacts on soils and geologic hazards. Any impact on soil characteristics and erosion rates would be slight and would return to pre-existing conditions shortly after project implementation activities.

Impacts from actions contained in this alternative would not result in impairment of soils or geologic resources in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Air Quality and Temperature

Implementation of Alternative B would result in negligible long-term beneficial impacts on air quality. The impacts on air quality would be below or at the lower levels of detection, or absent. Any impact on air quality would be slight and short-term, and air quality would be expected to return to pre-existing conditions shortly after the alternative has been implemented.

The five new removable exhibits, high-tech interpretive programs, large-scale battlefield relief model, Shirley House outdoor exhibit, interpretive exhibits at riverfront park units, and relic-hunting signage would have no impacts on air quality and temperature.

The Living History area improvements (shade trees and benches) and 10 benches in areas with shade trees along pull-outs would have no short-term impacts on air quality and temperature, and negligible long-term beneficial impacts from tree plantings. Air quality would not be impacted, or the impacts on air quality would be below or at the lower levels of detection. Any impact on air quality would be slight and short-term, and air quality would be expected to return to pre-existing conditions shortly after the alternative has been implemented.

The CCC wayside would result in negligible short-term adverse impacts on air quality and temperature from construction equipment, potential negligible long-term adverse impacts from tree clearing during construction, and potential negligible beneficial impacts from tree plantings. Air quality would not be impacted, or the impacts on air quality would be below or at the lower levels of detection. Any impact on air quality would be slight and short-term, and air quality would be expected to return to pre-existing conditions shortly after the alternative has been implemented.

The three 10-acre sites where BMPs would be implemented would result in negligible short-term adverse impacts on air quality and temperature from construction equipment and negligible long-term beneficial impacts from tree plantings or negligible adverse impacts from new clearings. Air quality would not be impacted, or the impacts on air quality would be below or at the lower levels of detection. Any impact on

air quality would be slight and short-term, and air quality would be expected to return to pre-existing conditions shortly after the alternative has been implemented.

Doubling of invasive alien plant species control efforts would result in no impacts on air quality and temperature. Invasive species would be replaced by native vegetation.

Privet eradication would have no impacts on air quality and temperature. Privet would be replaced by native vegetation.

Impacts from actions contained in this alternative would not result in impairment of air resources in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Surface Water Quality and Streamflow Characteristics

Implementation of Alternative B would result in negligible long-term beneficial impacts on water quality from application of BMPs to prevent erosion and provide vegetative buffers. No impacts on water quantity and streamflow characteristics would result if Alternative B were applied. The streams within the park would continue to receive abundant shade and organic material from the overhanging vegetative canopies. No land clearing would occur. A USACE 404 permit would not be necessary. MDEQ would not require the drafting of a SWPPP, which it otherwise would if any clearing adjacent to streams were to take place.

The 5 new removable exhibits, Living History area improvements (shade trees and benches), high-tech interpretive programs, large-scale battlefield relief model, Shirley House outdoor exhibit, interpretive exhibits at riverfront park units, relic-hunting signage, and 10 benches in areas with shade trees along pull-outs would not result in impacts on surface water quality and streamflow characteristics.

The CCC wayside would not result in impacts on surface water quality and streamflow characteristics (assuming proper BMPs are used during construction).

The three 10-acre sites where BMPs would be implemented would result in negligible short-term adverse impacts during construction, assuming proper BMPs are followed, and negligible long-term beneficial impacts from reduction of the erosion hazard in small areas. These impacts would not be detectable. For adverse impacts, water quality parameters would be well below all water quality standards for the designated use of the water. Both quality and quantity of flows would be within historical conditions.

The doubling of invasive alien plant species control efforts and privet eradication would result in negligible short-term adverse impacts during implementation, assuming proper BMPs are followed, and no long-term impacts. These impacts would not be detectable. Water quality parameters would be well below all water quality standards for the designated use of the water. Both quality and quantity of flows would be within historical conditions.

Impacts from actions contained in this alternative would not result in impairment of water resources in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Wetlands

Implementation of Alternative B would result in negligible long-term beneficial impacts on wetlands from application of BMPs to prevent erosion and protect existing features. No construction activities are proposed within the park's wetlands. The BMPs would be developed with the assistance of local experts to determine the most appropriate landcover for the park sites that are currently deteriorating due to erosion and/or the colonization of invasive species. The BMPs would focus primarily on soil erosion control, taking into consideration the role of vegetative cover composition, to ensure the survival of extant evidence of the siege.

The 5 new removable exhibits, Living History area improvements (shade trees and benches), high-tech interpretive programs, large-scale battlefield relief model, Shirley House outdoor exhibit, interpretive exhibits at riverfront park units, relic-hunting signage, and 10 benches in areas with shade trees along pull-outs would not result in impacts on wetlands.

The CCC wayside, doubling of invasive alien plant species control efforts, and privet eradication would not result in impacts on wetlands (assuming areas are not located within a wetland).

The three 10-acre sites where BMPs would be implemented would have no short-term impacts and negligible long-term beneficial impacts from preventing sedimentation in wetlands.

Impacts from actions contained in this alternative would not result in impairment of wetland resources in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Vegetation

Implementation of Alternative B would result in negligible to minor long-term beneficial impacts on vegetation due to the application of BMPs to prevent erosion, and the control of invasive species. The BMPs would be developed with the assistance of local experts to determine the most appropriate landcover for the park sites that are currently deteriorating due to erosion and/or the colonization of invasive species. The BMPs would focus primarily on soil erosion control, taking into consideration the role of vegetative cover composition, to ensure the survival of extant evidence of the siege. The initial focus would be on removing invasive plant species, such as kudzu and privet, that crowd out other soil-holding plants.

Additionally, implementation of Alternative B would result in beneficial impacts from the application of BMPs for the control of invasive species. The three 10-acre sites where BMPs would be implemented, doubling of invasive alien plant species control efforts, and privet eradication would result in minor short-term and long-term beneficial impacts because of the removal of invasive species.

The BMPs would be developed with the assistance of local experts to determine the most appropriate landcover for the park sites that are currently deteriorating because of erosion and/or the colonization of invasive species. Bermuda grass would be considered as a landscape treatment at the BMPs because of its ability to prevent erosion due to its fibrous root system (Appendix H). Bermuda grass is known to have been a desirable ground cover in Vicksburg during the time of the siege (Cotton, 2004). The BMPs would focus primarily on soil erosion control, taking into consideration the role of vegetative cover composition, for the survival of extant evidence of the siege. The initial focus would be on removing invasive plant species, such as kudzu and privet, that crowd out other soil-holding plants.

The five new removable exhibits, high-tech interpretive programs, large-scale battlefield relief model, Shirley House outdoor exhibit, interpretive exhibits at riverfront park units, and relic-hunting signage would have no impacts on vegetation.

The Living History area improvements (shade trees and benches) and 10 benches in areas with shade trees along pull-outs would not result in short-term impacts, but would result in negligible long-term beneficial impacts on vegetation due to the tree planting. These impacts may occasionally impact individual native plants, but measurable or perceptible changes in plant community size, integrity, or continuity would not occur.

The CCC wayside would result in no short-term impacts, potential negligible long-term adverse impacts on vegetation due to tree clearing during construction, and potential negligible beneficial impacts on vegetation from tree plantings. These potential impacts may occasionally affect individual native plants, but measurable or perceptible changes in plant community size, integrity, or continuity would not occur.

The three 10-acre sites where BMPs would be implemented, doubling of invasive alien plant species control efforts, and privet eradication would result in minor short-term and long-term beneficial impacts on vegetation due to the removal of invasive species. Impacts on native plants would be measurable or perceptible, but would be localized within a small area.

Impacts from actions contained in this alternative would not result in impairment of vegetation resources in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Wildlife and Habitat

Implementation of Alternative B would result in negligible long-term beneficial impacts on locally sensitive species and habitat. Beneficial impacts would occur on wildlife and habitat as a result of the application of BMPs to control invasive species. These potential impacts would not be measurable or of perceptible consequence to wildlife populations.

The five new removable exhibits, high-tech interpretive programs, large-scale battlefield relief model, Shirley House outdoor exhibit, interpretive exhibits at riverfront park units, and relic-hunting signage would not result in impacts on wildlife and habitat. No new disturbance would occur to wildlife and habitat as a result of these elements of Alternative B.

The Living History area improvements (shade trees and benches) and 10 benches in areas with shade trees along pullouts would result in potential negligible long-term and short-term adverse impacts on wildlife and habitat. Impacts on wildlife and habitat would potentially occur due to the increase in human presence associated with these elements of Alternative B. These potential impacts would not be measurable or of perceptible consequence to wildlife populations.

The CCC wayside would result in potential negligible short-term adverse impacts during construction and potential negligible long-term adverse impacts on wildlife and habitat due to the increase in human presence. These potential impacts would not be measurable or of perceptible consequence to wildlife populations.

The three 10-acre sites where BMPs would be implemented would result in potential negligible short-term adverse impacts on wildlife habitat during construction, and potential negligible long-term beneficial impacts on wildlife and habitat due to the removal of invasive species. Adverse impacts on wildlife and habitat would potentially occur during the establishment of the BMP sites. These potential impacts would

not be measurable or of perceptible consequence to wildlife populations. Beneficial impacts would potentially occur on wildlife and habitat as a result of the application of BMPs to control invasive species. These potential impacts would not be measurable or of perceptible consequence to wildlife populations.

Doubling invasive alien plant species control efforts and privet eradication would result in potential negligible short-term adverse impacts during implementation, and potential negligible long-term beneficial impacts due to the removal of invasive species. Adverse impacts would potentially occur on wildlife and habitat as existing vegetation is removed. Privet is a low-value (5 to 10 percent of diet) food source for mammals and birds, and an occasional source of cover for birds. These potential impacts would not be measurable or of perceptible consequence to wildlife populations. Beneficial impacts would potentially occur on wildlife habitat once the invasive species are replaced with native vegetation. These potential impacts would not be measurable or of perceptible consequence to wildlife populations.

Impacts from actions contained in this alternative would not result in impairment of wildlife resources and habitat in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Species of Concern

Implementation of Alternative B would result in negligible short-term adverse impacts and negligible long-term beneficial impacts on protected species due to the application of BMPs to control invasive species. The impacts on species of concern as a result of Alternative B would be at or below the level of detection and would not be measurable or of perceptible consequence to populations.

The five new removable exhibits, high-tech interpretive programs, large-scale battlefield relief model, Shirley House outdoor exhibit, and relic-hunting signage would not result in impacts on species of concern.

The Living History area improvements (shade trees and benches), CCC wayside, and 10 benches in areas with shade trees along pull-outs would result in potential minor short-term and long-term adverse impact on prairie nymph. If the prairie nymph occurs in these areas, impacts on the population would be measurable or perceptible, but localized within a small area. The mortality of an individual might occur, but the viability of populations would not be impacted, and the community, if left alone, would recover.

The three 10-acre sites where BMPs would be implemented would result in potential minor short-term and long-term adverse impacts on the prairie nymph in areas converted to forests, and potential minor long-term beneficial impacts on areas converted to meadows. If the prairie nymph occurs in these areas, impacts on the population would be measurable or perceptible, but localized within a small area. The mortality of an individual might occur, but the viability of populations would not be impacted, and the community, if left alone, would recover.

Doubling invasive alien plant species control efforts would result in potential minor short-term and long-term beneficial impacts on prairie nymph due to the control of invasive species in meadow areas. Controlling the invasive species in the meadow areas would create additional habitat for the prairie nymph.

Privet eradication would result in no impacts on species of concern (assuming privet areas are currently shrub areas and not suited to prairie nymph).

Interpretive exhibits at riverfront park units would not result in impacts on species of concern (assuming prairie nymph does not occur in these areas).

Impacts from actions contained in this alternative would not result in impairment of species of concern in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

NPS Operations and Facilities

Long-term Management and Sustainability of Resources

Implementation of Alternative B would result in minor long-term adverse impacts on park operations for maintenance of BMPs and additional interpretive technology. The three 10-acre sites where BMPs would be implemented would result in minor short-term and long-term adverse impacts on park operations from construction and maintenance.

Doubling invasive alien plant species control efforts would result in minor short-term and long-term adverse impacts on park operations for this continuous maintenance activity. Also, privet eradication would result in minor short-term adverse impacts on park operations to conduct eradication, and negligible long-term adverse impacts due to the maintenance of controlled areas.

The 5 new removable exhibits, Living History area improvements (shade trees and benches), large-scale battlefield relief model, CCC wayside, Shirley House outdoor exhibit, interpretive exhibits at riverfront park units, relic-hunting signage, and 10 benches in areas with shade trees along pull-outs would result in negligible short-term and long-term adverse impacts on park operations from construction and maintenance.

The high-tech interpretive programs would result in minor short-term adverse impacts on park operations from construction and training, and negligible long-term adverse impacts from maintenance.

ALTERNATIVE C – REHABILITATE/MAINTAIN KEY AREAS OF MILITARY ENGAGEMENT (PREFERRED ALTERNATIVE)

Alternative C would rehabilitate the park landscape in three key military areas and to incorporate enhanced interpretative elements. Each impact topic and the summary of impacts from this alternative are described below.

Recreational Resources, Aesthetics, and Visitor Experience

Recreational Resources

Alternative C would cause short-term negligible to minor adverse impacts and long-term minor beneficial impacts on recreational resources and uses in the park. Short-term negligible to minor adverse impacts may occur during clearing and implementation as areas of the park may be temporarily closed to recreation. However, these closures would be of short duration and would last for less than one year. The addition of amenities, including additional hiking trails and walking paths, shade trees, and benches, would benefit the recreational user of the park. Hiking trails and walking paths would enhance recreational use at the park, as existing trails at the park are not emphasized as featured recreational elements and are not consistently maintained. The benches and shade trees would not interfere with current recreational activities, but would be a convenience to recreational users who could utilize the new amenities. Park visitors would still be able to participate in walking, biking, hiking, and other recreational activities. Park attendance and availability of recreational resources are not expected to change if this alternative were implemented.

Aesthetics

As noted in Alternative A, the impacts on aesthetics associated with this alternative would largely depend on whether the visitor views the park as primarily a "cultural," "natural," or "recreational" site. The park contains many types of resources, and people tend to value different resources with varying degrees of intensity depending on individual preference. The beneficial and adverse impacts would be highly subjective depending on the individual visitor's opinions.

Implementation of Alternative C would result in minor to moderate short-term adverse impacts on all visitors during land disturbance activities. Moderate long-term beneficial impacts would occur on visitors interested in historic interpretation. Approximately 90 acres of tree clearing would enhance and expand current viewsheds of the battlefields. The new views would be adjacent to and similar in character to existing cleared areas. Negligible long-term beneficial impacts would occur on visitors using the park for recreation, as they may also appreciate the enhanced battlefield viewsheds. Minor long-term adverse impacts would occur on visitors who enjoy the forested aesthetic of the park.

The clearing of additional trees that obscure the view of the water battery from Fort Hill would result in minor long-term beneficial impacts on visitors interested in historic interpretation, negligible long-term beneficial impacts on visitors using the park for recreation, and minor long-term adverse impacts on visitors using the park for enjoying nature. All visitors would experience negligible short-term adverse impacts during clearing. The dramatic topography at Fort Hill affords long views toward Louisiana across the Yazoo River Diversion Canal flowing in the former channel of the Mississippi River. Similarly, clearing trees to provide a view from the artillery placed at the South Fort park unit would result in long-term beneficial impacts on visitors interested in historic interpretation, long-term beneficial impacts on visitors using the park for recreation, and long-term adverse impacts on visitors using the park for enjoying nature. This clearing would allow visitors to visualize the avenues of approach that the South Fort park unit defended.

Rehabilitation of the Shirley House landscape would result in negligible short-term adverse impacts from land-clearing activities on all visitors, minor long-term beneficial impacts on visitors interested in historic interpretation, and negligible long-term beneficial impacts on visitors using the park for recreation or enjoying nature. The rehabilitation would include reinstating features described in association with the property, such as vegetable and flower gardens, fruit trees, and walks. These features would enhance the park aesthetics to the benefit of all visitors.

The replanting of 20 to 25 acres with native vegetation would result in negligible short-term adverse impacts during planting on all visitors, and negligible long-term beneficial impacts on all visitors. This replanting would allow screening of development in the adjacent areas, improving the park aesthetics.

The enhanced interpretation elements, including the Living History area improvements, three new removable exhibits, and new waysides, would result in no short-term impacts and minor long-term beneficial impacts on the park aesthetics for visitors interested in historic interpretation. Visitors interested in recreation activities or the natural environment would likely not note a change in aesthetics from these items, as the park already has a number of interpretive features. Aesthetic benefits to all park visitors would include the enhancement of visitor comfort from additional benches and shade trees. The additional exhibits within the park Visitor Center would likely not have an impact on the overall aesthetics of the park. The increase in ranger patrols for relic hunting would have no aesthetic impacts on visitors.

The establishment of three new walking paths in rehabilitation areas would result in no short-term and negligible long-term beneficial impacts on park aesthetics for all visitors.

Visitor Use and Experience

As noted in the aesthetics section above, the impacts on visitor use and experience associated with this alternative would largely depend on whether the visitor views the park as primarily a "cultural," "natural," or "recreational" site. The visitor experience of someone who is interested in historical interpretation may differ drastically from that of someone who is interested in viewing wildlife and enjoying the natural environment.

Alternative C would prioritize interventions that enhance the experience of the visitor touring the park within a vehicle, as many visitors do. This alternative assumes that interpretation and education of visitors would feature authentic connections between physical resources and military events, taking the entire siege into consideration, and providing the key stories in association with the key landscape areas.

Implementation of Alternative C would result in moderate long-term beneficial impacts on visitors interested in historic interpretation. Those visitors would likely appreciate the expanded interpretation and enhanced visualization of the battlefields of the Vicksburg campaign. Negligible to minor beneficial impacts would occur on visitors using the park for recreation due to improved interpretation and the increased range of recreation activities available to visitors, although the loss of shade in some areas of the park may adversely impact these visitors. Minor adverse impacts would occur on visitors using the park for enjoying nature due to the value those visitors may place on the forested areas proposed to be cleared. These visitors would be beneficially impacted in the long term by the addition of trails to the park's natural features.

The rehabilitation of 90 acres of landscape by clearing would result in minor to moderate short-term adverse impacts from construction activities to all visitors, moderate long-term beneficial impacts on visitors interested in historic interpretation as battlefields are open for viewing and interpretation, negligible to minor long-term adverse impacts on visitors using the park for recreation (loss of shade), and minor long-term adverse impacts on visitors using the park for enjoying nature.

The doubling of invasive alien plant species control efforts would result in minor short-term adverse impacts on all visitors during clearing activities, and negligible long-term beneficial impacts on all visitors by providing forested areas of native vegetation.

Use of the cleared area for Living History area improvements would result in minor short-term and long-term beneficial impacts on visitors interested in historic interpretation and negligible short-term and long-term beneficial impacts on visitors using the park for recreation or enjoying nature.

The clearing of additional trees that obscure the view of the water battery from Fort Hill would result in negligible short-term adverse impacts during clearing to all visitors, minor to moderate long-term beneficial impacts on visitors interested in historic interpretation, negligible long-term beneficial impacts on visitors using the park for recreation, and minor long-term adverse impacts on visitors using the park for enjoying nature.

The establishment of three new removable exhibits within the siege landscape would result in moderate long-term beneficial impacts on visitors interested in historic interpretation and negligible long-term beneficial impacts on visitors using the park for recreation or enjoying nature. The removable exhibits would facilitate visitor understanding of missing military features such as earthworks and associated components.

The rehabilitation of the Shirley House landscape would result in minor short-term adverse impacts from construction activities to all visitors, minor long-term beneficial impacts on visitors interested in historic

interpretation, and negligible long-term beneficial impacts on visitors using the park for recreation or enjoying nature.

The six new interpretive waysides and the CCC wayside would result in minor short-term and long-term beneficial impacts on visitors interested in historic interpretation, and negligible short-term and long-term beneficial impacts on visitors using the park for recreation or enjoying nature.

Tree thinning along 3 miles of the tour road would result in negligible short-term adverse impacts on all visitors during clearing, minor long-term beneficial impacts on visitors interested in historic interpretation, negligible long-term beneficial impacts on visitors using the park for recreation, and negligible to minor long-term adverse impacts on visitors using the park for enjoying nature. The thinning of trees associated with artillery positions would occur only in areas where visitors would benefit from this action, because either the tour road or proposed new parking pull-offs and trails would afford visual access.

Clearing trees to provide a view from the artillery placed at the South Fort park unit would result in short-term adverse impacts on all visitors during clearing, minor to moderate long-term beneficial impacts on visitors interested in historic interpretation, negligible long-term beneficial impacts on visitors using the park for recreation, and minor long-term adverse impacts on visitors using the park for enjoying nature.

The replanting of 20 to 25 acres with native vegetation, the increase in ranger patrols for relic hunting, and the 20 additional benches in areas with shade trees along pullouts would result in negligible short-term and long-term beneficial impacts on all visitors.

The three new walking paths in the rehabilitation areas would result in minor long-term beneficial impacts on visitors interested in historic interpretation, minor to moderate long-term beneficial impacts on visitors using the park for recreation, and minor long-term beneficial impacts on visitors using the park for enjoying nature.

Cultural Resources

Cultural Landscape

Implementation of Alternative C would result in minor to moderate long-term beneficial impacts on cultural landscapes as the establishment of turf and tree clearing preserve cultural landscape features. By removing the overlying, non-historical vegetative cover, cultural landscape features (markers, monuments, trench lines, and natural ravines) are made visible. Once vegetation is removed, Vicksburg NMP staff would have an enhanced ability to detect and correct any erosion that occurs. The proposed alternative would have no adverse effect on NRHP-eligible cultural resources under Section 106 of the NHPA.

The interpretive potential of a cleared landscape to illuminate history would be realized, resulting in a greater understanding of the siege of Vicksburg on the part of the visiting public. In addition, the park would be better able to meet its legislated goal of restoring the battlefield to a semblance of its wartime appearance.

As in Alternative B, the doubling of invasive plant species control efforts would result in negligible short-term adverse impacts during control activities and negligible long-term beneficial impacts on the cultural landscape. These invasive plants obscure the terrain, so their removal would benefit the cultural landscape. However, they tend to be located along the park boundaries and in areas where forested woodlands occur, so the benefit of clearing the invasive plants occurs in areas where there are few

significant cultural landscape features or where the cultural landscape would continue to be obscured by native vegetation.

Likewise, the clearing of additional trees that obscure the view of the water battery from Fort Hill, tree thinning along 3 miles of tour road, and clearing of trees to provide a view from the artillery placed at the South Fort park unit would result in minor short-term and long-term beneficial impacts by revealing the cultural landscape and allowing Vicksburg NMP staff to address erosion problems as they occur.

The replanting of 20 to 25 acres with native vegetation would result in negligible short-term and long-term beneficial impacts by minimizing intrusion into the cultural landscape from surrounding development outside the park.

The use of the cleared area for Living History area improvements, 20 additional benches in areas with shade trees along pullouts, establishment of 3 new removable exhibits within the siege landscape, 6 new interpretive waysides, and the CCC wayside could result in negligible short-term and long-term adverse impacts on cultural landscapes depending on their location within Vicksburg NMP. These elements are not historically accurate representations of the cultural landscape, and their inclusion may detract from the cultural landscape.

As in Alternative B, rehabilitation of the Shirley House landscape would result in negligible short-term and long-term beneficial impacts on the cultural landscape as the cultural landscape during the Vicksburg siege is restored. Some negligible short-term and adverse impacts on the cultural landscape would be expected during construction, but these impacts would be temporary in nature and restored once construction was completed. Similarly, the five new removable exhibits would result in negligible short-term and long-term beneficial and adverse impacts on cultural landscapes.

The increase in ranger patrols for relic hunting would have no impacts on the cultural landscape.

The three new walking paths in rehabilitation areas would result in negligible short-term and long-term beneficial impacts on the cultural landscape.

Impacts from actions contained in this alternative would not result in impairment of the cultural landscape in the park (see specific definition of “impairment” in the discussion of “Impairment Analysis Method” on page 4-2).

Historic Resources

Implementation of Alternative C would result in minor long-term beneficial impacts on historic resources because historic features are protected under Alternative C, mainly as a result of improvement of the historic character of the Shirley House landscape. The proposed alternative would have no adverse effect to NRHP-eligible cultural resources under Section 106 of the NHPA.

The rehabilitation of 90 acres of landscape by clearing would result in minor short-term adverse impacts during construction and moderate long-term beneficial impacts by restoring the historic viewsheds from existing historic areas of Vicksburg NMP. All of the other features of this alternative would be designed in such a way as to not directly impact any historic resources. There may be negligible adverse impacts during construction and/or clearing, but there would be no long-term adverse impacts on known historic resources.

The doubling of invasive alien plant species control efforts would have potential negligible short-term adverse impacts if areas are within the APE of historic resources, and no long-term impacts.

The use of the cleared area for Living History area improvements, 6 new interpretive waysides, CCC wayside, replanting of 20 to 25 acres with native vegetation, and 20 benches in areas with shade trees along pull-outs would not result in impacts on historic resources (assuming the area is not within the APE of historic resources).

The clearing of additional trees that obscure the view of the water battery from Fort Hill, tree thinning along 3 miles of the tour road, and clearing of trees to provide a view from the artillery placed at the South Fort park unit would result in potential negligible short-term adverse impacts from cutting activity if areas are within the APE of historic resources. No long-term impacts would occur on historic resources.

The establishment of three new removable exhibits within the siege landscape and increase in ranger patrols for relic hunting would not result in impacts on historic resources.

The rehabilitation of the Shirley House landscape would result in minor short-term adverse impacts from rehabilitation construction and moderate long-term beneficial impacts from rehabilitation.

The three new walking paths in rehabilitation areas would result in negligible short-term and long-term adverse impacts from construction and placement within the historic viewshed if the trails were within the APE.

Impacts from actions contained in this alternative would not result in impairment of historic resources in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Archeological Resources

The rehabilitation of 90 acres of landscape by clearing would result in potential minor short-term adverse impacts from ground disturbance (assuming no significant archeological sites are disturbed), and potential minor long-term adverse impacts due to making potential archeological sites more readily accessible. The proposed alternative would have no adverse effect on NRHP-eligible cultural resources under Section 106 of the NHPA. NPS cultural resources personnel would conduct site surveys before, during, and after the project to ensure that archeological resources are protected. Protocols would be established to be followed if archeological resources are discovered during land-clearing activities. The two potential archeologically significant sites identified in 1997 are not located within the proposed rehabilitation areas for Alternative C.

The doubling of invasive alien plant species control efforts would not result in impacts on archeological resources. The use of the cleared area for Living History area improvements, the replanting of 20 to 25 acres with native vegetation, and the 20 benches in areas with shade trees along pull-outs would result in potential negligible short-term adverse impacts from tree planting (assuming no significant archeological sites are disturbed), and no long-term impacts. The clearing of additional trees that obscure the view of the water battery from Fort Hill, the establishment of three new removable exhibits within the siege landscape, tree thinning along 3 miles of the tour road, and clearing of trees to provide a view from the artillery placed at the South Fort park unit would not result in impacts on archeological resources, assuming there is no associated soil disturbance.

The rehabilitation of the Shirley House landscape would result in potential negligible short-term adverse impacts from ground disturbance around the Shirley House. As described above, NPS cultural resources personnel would conduct site surveys before, during, and after the project to ensure that archeological resources are protected. No long-term impacts on archeological resources from this activity are expected.

The six new interpretive waysides, CCC wayside, and three new walking paths in rehabilitation areas would result in potential negligible short-term adverse impacts from ground disturbance (assuming no significant archeological sites would be disturbed), and no long-term impacts on archeological resources.

The increase in ranger patrols for relic hunting would result in minor short-term and long-term beneficial impacts on archeological resources by minimizing disturbance.

Impacts from actions contained in this alternative would not result in impairment of archeological resources in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Section 106 Statement on the Preferred Alternative

After applying ACHP's criteria of adverse effects (36 CFR 800.5, "Assessment of Adverse Effects"), NPS concludes that implementation of the Preferred Alternative would *not* have an adverse effect on any historic property (*i.e.*, any area or object included on, or eligible for inclusion on, the NRHP).

As required by Section 106 of the NHPA, NPS has initiated informal consultation with the Mississippi SHPO regarding this project. NPS would also consult with other interested parties, as appropriate. Comments on the project from SHPO and other interested parties would be addressed in the final compliance documents. Should the need arise, additional mitigation measures would be developed in consultation with SHPO.

Natural Resources

Soils and Geologic Hazards

Alternative C would result in minor long-term beneficial impacts on soils and geologic hazards from larger cleared areas due to a decreased potential for erosion. Impacts on soils would be detectable, and impacts on soil characteristics and erosion rates would be small. Alternative C assumes that BMPs, particularly as a means for soil erosion control, would be taken into consideration in determining the extent of areas undergoing landcover changes, such as the removal of tree cover that obscures siege lines, avenues of approach, obstacle locations, engagement sites, key terrain, and observation sites. BMPs would be applied to the process of altering existing landcover to reveal obscured resources and areas. Determination of the appropriate BMPs would require investigation into the range of vegetation types that would allow enhanced visual accessibility yet ensure retention of the existing soil profile and protect against erosion by stormwater. Additional investigation into the alternatives for protecting loess soil from erosion through landcover management would be conducted annually and findings applied to revision of the BMPs. Investigation might include consultation with local managers of natural areas or large land parcels maintained in open vegetative cover who are successfully controlling erosion. Sod-forming grasses, such as Bermuda grass, act to hold loess soil in place by virtue of its highly fibrous root system (Appendix H). Thus, erosion of the cultural landscape would be reduced, and any gullies that form would immediately be visible and could be attended to before they become injurious.

The rehabilitation of 90 acres of landscape by clearing would result in minor short-term adverse impacts during construction, assuming proper BMPs are followed, and minor long-term beneficial impacts on soils and geologic hazards due to decreased erosion issues. Areas north and west of Thayer's Approach are the most heavily forested, are associated with water resources, and have high potential for erosion. These areas are less desirable to clear and would primarily be left in their current condition, although consideration would be paid to expose the visual connection between the water battery and Fort Hill.

Doubling of invasive alien plant species control efforts would result in negligible short-term adverse impacts during implementation, assuming proper BMPs are followed, and no long-term impacts on soils and geologic hazards. The impacts on soils would be below or at the lower levels of detection. Any impact on soil characteristics and erosion rates would be slight and would return to pre-existing conditions shortly after project implementation activities.

The use of the cleared area for additional Living History programs, 3 new removable exhibits, rehabilitation of the Shirley House landscape, tree thinning along 3 miles of the tour road, increase in ranger patrols for relic hunting, and 20 benches in areas with shade trees along pull-outs would not result in impacts on soils and geologic hazards.

The clearing of trees that obscure the view from Fort Hill, six new interpretive waysides, CCC wayside, clearing of trees to provide a view from the artillery placed at the South Fort park unit, replanting of 20 to 25 acres with native vegetation, and three new walking paths in rehabilitation areas would result in negligible short-term adverse impacts during construction, assuming proper BMPs are followed, and no long-term impacts on soils and geologic hazards. Any impact on soil characteristics and erosion rates would be slight and would return to pre-existing conditions shortly after project implementation activities.

Impacts from actions contained in this alternative would not result in impairment of soils and geologic resources in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Air Quality and Temperature

Implementation of Alternative C would result in negligible to minor long-term adverse impacts on local air quality from increased localized temperatures and emissions from maintenance equipment.

The rehabilitation of 90 acres of landscape by clearing would result in negligible to minor short-term adverse impacts on air quality and temperature due to construction equipment, and potential negligible long-term adverse impacts on air quality and temperature from tree removal. Construction activities such as the operation of diesel engines and land clearing would have short-term adverse impacts on air quality. Tree removal may result in increased local air temperature. Maximum mid-day air temperature reductions due to the presence of trees are in the range of 0.04^{o} Celsius (C) to 0.2^{o}C per percent canopy cover increase. The reduced air temperature resulting from the abundance of trees can improve air quality because the emission of many pollutants and/or ozone-forming chemicals is temperature-dependent (USDA, 2008). These adverse impacts on air quality would be below or at the lower levels of detection. Any impact on air quality would be slight and short-term, and air quality would be expected to return to pre-existing conditions shortly after the alternative has been implemented.

Doubling of invasive alien plant species control efforts would have no impacts on air quality and temperature. Invasive species would be replaced by native vegetation.

The use of the cleared area for additional Living History programs and 20 benches in areas with shade trees along pullouts would result in no short-term impacts and negligible long-term beneficial impacts from tree plantings.

Clearing the trees that obscure the view from Fort Hill, tree thinning along 3 miles of the tour road, and clearing trees to provide a view from the artillery placed at the South Fort park unit would result in potential negligible short-term and long-term adverse impacts on air quality and temperature from vegetation removal (less shade and more greenhouse gases).

Three new removable exhibits would result in no impacts on air quality and temperature.

The rehabilitation of the Shirley House landscape and three new walking paths in rehabilitation areas would result in negligible short-term adverse impacts on air quality and temperature from construction equipment, and no long-term impacts.

The six new interpretive waysides and the CCC wayside would result in negligible short-term adverse impacts on air quality and temperature from construction equipment, potential negligible long-term adverse impacts from tree clearing during construction, and potential negligible beneficial impacts from tree plantings.

Replanting of 20 to 25 acres with native vegetation would result in potential negligible short-term and long-term beneficial impacts on air quality and temperature from tree planting (more shade and fewer greenhouse gases).

The increase in ranger patrols for relic hunting would result in potential negligible short-term and long-term adverse impacts on air quality and temperature from the additional use of vehicles.

Impacts from actions contained in this alternative would not result in impairment of air resources in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Surface Water Quality and Streamflow Characteristics

Implementation of Alternative C would result in negligible short-term adverse impacts on water quality because of increased erosion, and negligible long-term adverse impacts on water quantity and streamflow because of increased runoff from removal of vegetation.

The rehabilitation of 90 acres of landscape by clearing would result in minor short-term adverse impacts on water quality during construction, assuming proper BMPs are followed, and minor long-term adverse impacts on water quality and quantity as a result of increased runoff due to vegetation removal. One intermittent stream would be impacted due to the reduction or removal of cover. An appropriate stormwater permit prior to construction may need to be obtained from MDEQ. Impacts would be measurable, but water quality parameters would be well within all water quality standards for the designated use. Both quality and quantity of flows would be within the range of historical conditions.

Doubling of invasive alien plant species control efforts would result in negligible short-term adverse impacts during implementation, assuming proper BMPs are followed, and no long-term impacts.

The use of the cleared area for additional Living History programs, clearing trees that obscure the view from Fort Hill, 3 new removable exhibits, rehabilitation of the Shirley House landscape, tree thinning along 3 miles of the tour road, clearing trees to provide a view from the artillery placed at the South Fort park unit, increase in ranger patrols for relic hunting, and 20 benches in areas with shade trees along pull-outs would not result in impacts on surface water quality and streamflow characteristics.

The six new interpretive waysides and the CCC wayside would not result in impacts on surface water quality and streamflow characteristics (assuming proper BMPs are used during construction).

The replanting of 20 to 25 acres with native vegetation would result in no short-term impacts and negligible long-term beneficial impacts on water quality and quantity.

The three new walking paths in rehabilitation areas would result in negligible short-term adverse impacts during construction, assuming proper BMPs are followed, and no long-term impacts.

Impacts from actions contained in this alternative would not result in impairment of water resources in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Wetlands

Implementation of Alternative C would result in minor long-term adverse impacts on wetland areas from clearing and removal of vegetation in wetlands and/or conversion of 7 acres of forested wetlands to scrub-shrub or emergent wetlands. Impacts on wetlands would be long-term, and would require a USACE 404 permit and appropriate mitigation measures. Figure 4-1 shows the potential wetland impacts under Alternative C.

The rehabilitation of 90 acres of landscape by clearing would result in moderate short-term adverse impacts on wetlands as a result of their conversion from forested to scrub-shrub and emergent wetlands. Potential impacts on wetlands from battlefield rehabilitation would involve clearing vegetation from 7.01 acres of forested wetland. Within a 50-foot buffer along streams (25 feet on each side), trees taller than 15 feet would be removed, while trees shorter than 15 feet would remain. This 50-foot streambank buffer would be replanted with native species as necessary to maintain woody vegetation along the streambanks. Vegetation in the buffer would be maintained at a maximum height of 15 feet using commercial pruning and trimming equipment. Outside the 50-foot streambank buffer, wetland areas would be replanted with low-growing native grasses. Native woody vegetation would be allowed to naturally repopulate this area but would be maintained to a maximum height of 15 feet.

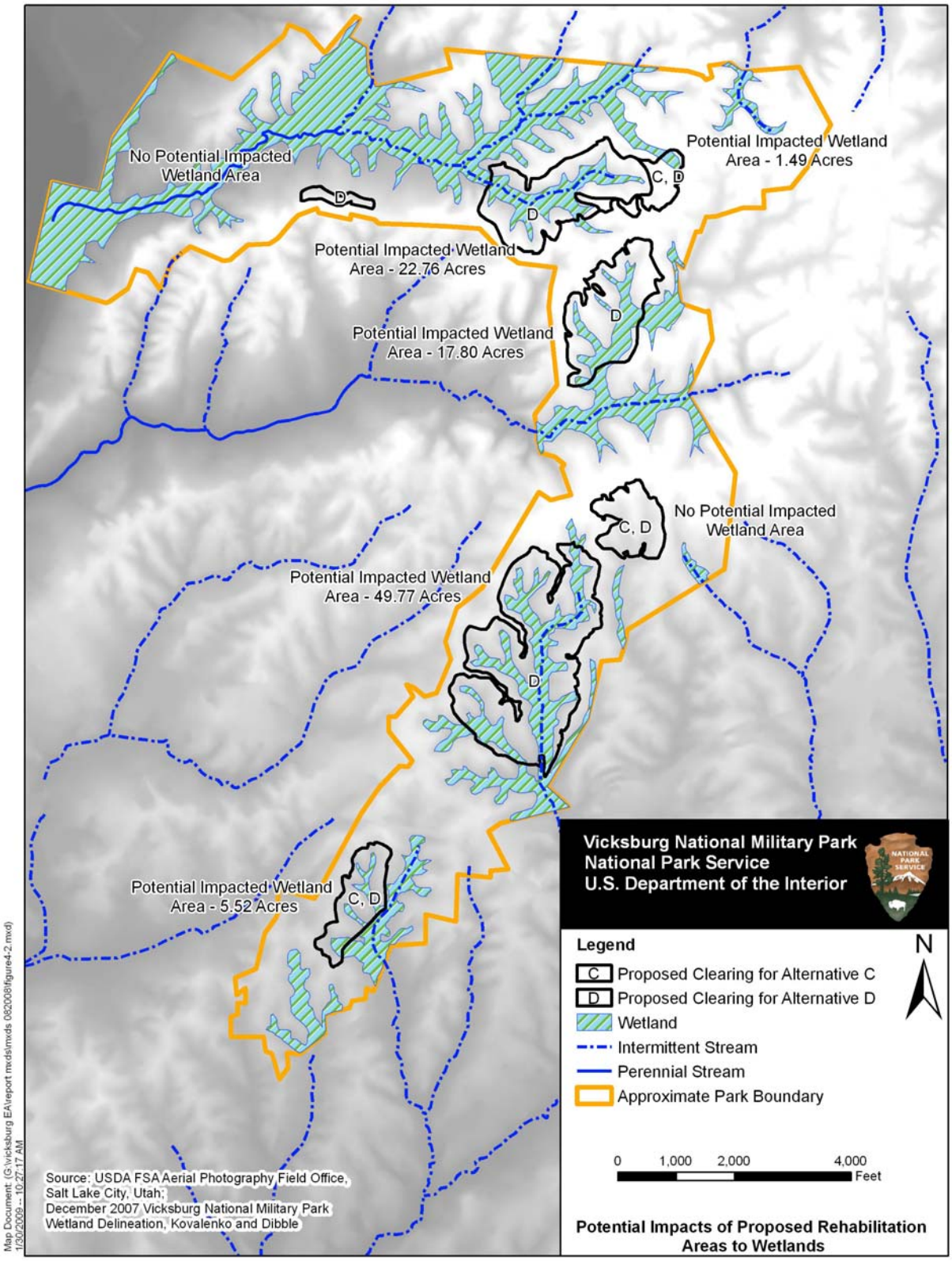
Replacement of the wetland forest with a maintained scrub-shrub forest with a maximum canopy height of 15 feet would diminish some functional values in this area. The 50-foot buffer along streams would be cleared of exotic vegetation and vegetation taller than 15 feet, while other vegetation would remain within the 50-foot streambank buffer. Streams would no longer be shaded by mature trees, potentially resulting in elevated water temperatures during and after construction. A reduction in the amount of organic plant material entering the stream ecosystem may occur with the removal of larger trees. Removal of the larger trees would reduce the opportunity for adding large woody debris to the stream channels, which is an important component of a healthy stream system (Kovalenko and Dibble, 2007).

As with many of the riparian areas within the park, the wetlands in this area have become dominated by Chinese privet, an invasive species that the park is attempting to control. Clearing in this area would allow for the removal of privet and the re-establishment of native wetland and riparian species within the cleared areas.

The Wetland SOF identified several measures that would mitigate the potential wetland impacts. These mitigation measures include the following:

- After clearing, 7.01 acres of stream corridor and palustrine wetland in the Two-mile Creek and Mint Spring Bayou areas outside the 50-foot streambank buffer would be replanted with native grasses. Woody vegetation would be allowed to naturally regenerate in this area but would be maintained at a maximum height of 15 feet using commercial pruning and trimming equipment. Privet and other exotic species control in these areas would be conducted to avoid re-introduction of invasive species.

Figure 4-1 Impacts of Proposed Rehabilitation Areas on Wetlands



- A 50-foot buffer (25 feet per side) of native scrub-shrub vegetation would be maintained at a 15-foot height or less along impacted stream corridors. Within the 50-foot streambank buffer, trees taller than 15 feet would be removed, while trees shorter than 15 feet would remain. The 50-foot streambank buffer would be replanted with native species as necessary to maintain woody vegetation along the streambanks. Vegetation in this area would be maintained at a maximum height of 15 feet using commercial pruning and trimming equipment. Native species to be replanted are noted in Appendix C.

- A total of 0.20 acre of wetland currently maintained in herbaceous vegetation along Union Avenue downslope from the Michigan Monument would be replanted with native plant species. This area, cleared more than 30 years ago and currently maintained as a grassed field, would be allowed to return to a forested wetland. Species to be replanted are noted in Appendix C.

- Approximately 0.50 acre of a 1.16-acre parcel containing "Dry Bayou," a natural spring that has been disturbed by development, would be restored by removing debris, removing non-native vegetation, and replanting with native wetland plant species noted in Appendix C. The spring is adjacent to Vicksburg National Cemetery and was disturbed during construction of commercial facilities on the parcel. Vicksburg NMP acquired the "Dry Bayou" property in 2003.

- The park would eradicate exotic plants on approximately 22 acres of forested wetlands in the Durden Creek watershed. Privet and other invasive exotics would be removed from this area.

None of the other proposed features of this alternative are proposed to be constructed in wetlands.

Impacts from actions contained in this alternative would not result in impairment of wetland resources in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Vegetation

Implementation of Alternative C would result in minor long-term adverse impacts on vegetation due to clearing and to the conversion of forested woodlands to open meadow systems. The primary landcover for the open meadow systems is currently assumed to be turf grass or native grasses, although it may be possible in steeply sloped areas and ravines to vary the landcover management to include less frequent mowing, burning, and the use of meadow species rather than Bermuda grass or other turf grasses requiring frequent mowing.

The forested areas would be converted using BMPs, and the older native trees that do not block important views would be retained. Impacts on native plants would be measurable or perceptible, but would be localized within a small area. The viability of the plant community would not be impacted, and the community, if left alone, would recover.

The rehabilitation of 90 acres of landscape by clearing would result in minor short-term and long-term adverse impacts on vegetation due to conversion from forested to maintained meadow. Impacts on native plants would be measurable or perceptible, but would be localized within a small area. The viability of the plant community would not be impacted, and the community, if left alone, would recover.

Implementation of Alternative C would result in beneficial impacts from removal of invasive species during clearing and application of BMPs to control invasive species. The doubling of invasive alien plant species control efforts would result in minor short-term and long-term beneficial impacts on vegetation

due to the removal of invasive species. Impacts on native plants would be measurable or perceptible, but would be localized within a small area.

The use of the cleared area for additional Living History programs and 20 benches in areas with shade trees along pullouts would result in no short-term impacts and negligible long-term beneficial impacts on vegetation due to tree plantings. These impacts may occasionally affect individual native plants, but measurable or perceptible changes in plant community size, integrity, or continuity would not occur.

The clearing of trees that obscure the view from Fort Hill, tree thinning along 3 miles of the tour road, clearing of trees to provide a view from the artillery placed at the South Fort park unit, and three new walking paths in rehabilitation areas would result in negligible short-term and long-term adverse impacts on vegetation due to vegetation removal. These impacts may occasionally impact individual native plants, but measurable or perceptible changes in plant community size, integrity, or continuity would not occur.

The three new removable exhibits, rehabilitation of the Shirley House landscape, and increase in ranger patrols for relic hunting would not result in impacts on vegetation.

The six new interpretive waysides and the CCC wayside would result in no short-term impacts, potential negligible long-term adverse impacts due to tree clearing during construction, and potential negligible beneficial impacts on vegetation from tree plantings. These potential impacts may occasionally impact individual native plants, but measurable or perceptible changes in plant community size, integrity, or continuity would not occur.

The replanting of 20 to 25 acres with native vegetation would result in minor short-term and long-term beneficial impacts on vegetation due to the conversion of meadow/maintained areas to native forest vegetation. Impacts on native plants would be measurable or perceptible, but would be localized within a small area.

Impacts from actions contained in this alternative would not result in impairment of vegetation resources in the park (see specific definition of “impairment” in the discussion of “Impairment Analysis Method” on page 4-2).

Wildlife and Habitat

Implementation of Alternative C would result in minor long-term adverse impacts on locally sensitive species that utilize habitats in the park, and minor to moderate long-term beneficial impacts on locally sensitive floral species that currently use park meadows. Adverse impacts would be more pronounced for faunal species that have small home ranges or territories since they would be less likely to escape the impacts of forest clearing (species with small home ranges are listed in Appendix F). Individual animal mortality may occur if the species is not able to migrate to adjoining forested areas, but the viability of wildlife populations would not be impacted.

Adverse impacts would occur on wildlife and habitat as a result of the conversion of forested area to cleared area. Impacts would be specific to the wildlife that primarily inhabit the forested areas of the park (Appendix F). Forest species are reliant upon woodland resources to successfully survive and reproduce. Neotropical songbirds, in particular, use the thickly wooded ravine and ridge habitat preserved in the park.

Beneficial and/or adverse impacts would also occur on wildlife and habitat as a result of the conversion of forested area to cleared area, depending upon their habitat requirements. Land clearing within the project

area would create additional edge-transitional habitat. A quality habitat contains structural and compositional heterogeneity, which provides for microhabitats and food sources that support species diversity. Wildlife and habitat would be enhanced as a result of the interspersion of woods and open areas. These impacts on wildlife or habitat would be measurable or perceptible, but localized within a small area.

The conversion of forested wetland to native grasses and scrub-shrub areas may alter the faunal community that uses the area. Wildlife that prefer forested wetlands would relocate to other adjacent areas that remain forested, while species that prefer open or scrub-shrub wetland habitats would utilize the new habitats. The loss of mature trees would eliminate canopy cover, nesting, and food sources used by some wildlife species. During the short-term transition period immediately after tree removal, the reduced canopy cover would likely increase soil and water temperatures, which may be harmful to fish, reptiles, amphibians, and other water-dependent wildlife. However, because the streams in this area are ephemeral and intermittent, the impacts on aquatic fauna utilizing this area are expected to be minimal. During the short-term transition period, there may be increased potential for erosion of exposed soils.

Doubling invasive alien plant species control efforts would result in potential negligible short-term adverse impacts during implementation, and potential negligible long-term beneficial impacts resulting from the removal of invasive species. Adverse impacts would potentially occur on wildlife habitat as existing vegetation is removed. Beneficial impacts would potentially occur on wildlife habitat once the invasive species are replaced with native vegetation. These potential impacts would not be measurable or of perceptible consequence to wildlife populations.

The use of cleared area for additional Living History programs, the 3 new walking paths in rehabilitation areas, and the 20 benches in areas with shade trees along pullouts would result in negligible short-term adverse impacts from construction, and negligible long-term adverse impacts on wildlife and habitat. The impacts would potentially occur due to the increase in human presence associated with these elements of Alternative C. These potential impacts would not be measurable or of perceptible consequence to wildlife populations.

Clearing the trees that obscure the view from Fort Hill, tree thinning along 3 miles of tour road, and clearing trees to provide a view from the artillery placed at the South Fort park unit would result in potential negligible short-term adverse impacts during implementation, and no long-term impacts. Adverse impacts would potentially occur on wildlife and habitat as existing vegetation is removed, reducing the amount of forested habitat in the immediate area. This may cause species to relocate to other parts of the park or outside the park. These potential impacts would not be measurable or of perceptible consequence to wildlife populations.

The three new removable exhibits, rehabilitation of the Shirley House landscape, and increase in ranger patrols for relic hunting would have no impacts on wildlife and habitat. No new disturbance would occur on wildlife habitat as a result of these elements of Alternative C.

The six new interpretive waysides and CCC wayside would result in potential negligible short-term adverse impacts during construction and potential negligible long-term adverse impacts from the disturbance of wildlife due to the presence of humans in the area. These potential impacts would not be measurable or of perceptible consequence to wildlife populations.

The replanting of 20 to 25 acres with native vegetation would result in negligible short-term adverse impacts during clearing and planting, and minor long-term adverse and/or beneficial impacts from the conversion of meadows and edge habitat to forest. These minor impacts would be specific to the wildlife that mainly inhabit cleared areas of the park (Appendix F). Species that prefer forested areas would

utilize the new wooded habitats, while species that prefer open or scrub-shrub habitats would relocate to other adjacent areas that remain cleared. Impacts on wildlife or habitat would be measurable or perceptible, but localized within a small area.

Impacts from actions contained in this alternative would not result in impairment of wildlife resources and habitat in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Species of Concern

Implementation of Alternative C would result in negligible long-term adverse impacts on protected species that utilize forested habitats in the park, and negligible to minor long-term beneficial impacts on protected species that utilize meadow habitats in the park. Alternative C would reduce the acreage of forested areas of the park and increase the acreage of meadows in the park.

The rehabilitation of 90 acres of landscape by clearing would result in potential minor to moderate short-term and long-term beneficial impacts on prairie nymph habitat. Prairie nymph prefer the meadow habitat that would be created by the 90 acres of landscape clearing and would potentially colonize the areas that are proposed to be cleared under Alternative C.

Doubling invasive alien plant species control efforts would result in potential minor short-term and long-term beneficial impacts on the prairie nymph due to control of invasive species in meadow areas. Controlling the invasive species in the meadow areas would create additional habitat for the prairie nymph or other species of concern that prefer the meadow habitat.

The use of the cleared area for additional Living History programs, 6 new interpretive waysides, CCC wayside, replanting of 20 to 25 acres with native vegetation, 3 new walking paths in rehabilitation areas, and 20 benches in areas with shade trees along pull-outs would result in potential minor short-term and long-term adverse impacts on the prairie nymph. Impacts on species of concern would be measurable or perceptible, but localized within a small area. The mortality of an individual might occur, but the viability of populations would not be impacted, and the community, if left alone, would recover.

The clearing of trees that obscure the view from Fort Hill and clearing of trees to provide a view from the artillery placed at the South Fort park unit would result in potential negligible short-term and long-term beneficial impacts on the prairie nymph habitat if the species is present.

The three new removable exhibits, rehabilitation of the Shirley House landscape, tree thinning along 3 miles of the tour road, and increase in ranger patrols for relic hunting would not result in impacts on species of concern.

Impacts from actions contained in this alternative would not result in impairment of species of concern in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Section 7 Statement on Preferred Alternative

After applying the criteria of adverse effect contained in Section 7 of the federal ESA (16 USC 1536; 50 CFR 402), NPS concludes that implementation of the Preferred Alternative would have no effect on any federally listed threatened or endangered species. This conclusion is based on site inspections of potentially impacted areas, professional knowledge of threatened and endangered species at Vicksburg NMP, and informal consultation with USFWS.

NPS Operations and Facilities

Long-term Management and Sustainability of Resources

Implementation of Alternative C would result in minor to moderate long-term adverse impacts on park operations for maintenance of cleared areas.

The rehabilitation of 90 acres of landscape by clearing would result in minor short-term adverse impacts on park operations from construction activities, and minor to moderate long-term impacts on park operations due to maintenance of cleared areas. Additionally, some park operations would be easier and more effective after clearing, such as monitoring for erosion and park patrols.

Doubling invasive alien plant species control efforts would result in minor short-term and long-term adverse impacts on park operations for this continuous maintenance activity.

The use of the cleared area for additional Living History programs, 3 new removable exhibits, rehabilitation of the Shirley House landscape, tree thinning along 3 miles of the tour road, 6 new interpretive waysides, CCC wayside, 3 new walking paths in rehabilitation areas, and 20 benches in areas with shade trees along pull-outs would result in negligible short-term and long-term adverse impacts on park operations from construction and maintenance.

The clearing of trees that obscure the view from Fort Hill, clearing of trees to provide a view from the artillery placed at the South Fort park unit, replanting of 20 to 25 acres with native vegetation, and increase in ranger patrols for relic hunting would result in minor short-term and long-term adverse impacts on park operations from construction and maintenance.

ALTERNATIVE D – REHABILITATE/MAINTAIN THE BROAD SPECTRUM OF MILITARY ENGAGEMENTS

Alternative D is to rehabilitate extensive areas of the park landscape over a broad spectrum of military areas and to incorporate enhanced interpretative elements. Each impact topic and the summary of impacts from this alternative are described below.

Recreational Resources, Aesthetics, and Visitor Experience

Recreational Resources

Alternative D would cause short- and long-term minor beneficial impacts on recreational resources and uses in the park by the addition of amenities including additional hiking trails and walking paths, shade trees, and benches. Hiking trails and walking paths would enhance recreational use at the park, as existing trails at the park are not emphasized as featured recreational elements and are not consistently maintained. Additional shade trees and benches would not interfere with current recreational activities, but would be a convenience to recreational users who could utilize the new amenities. Park visitors would still be able to participate in walking, biking, hiking, and other recreational activities. Park attendance and availability of recreational resources are not expected to change if this alternative were implemented.

Aesthetics

As noted in Alternative A, the impacts on aesthetics associated with this alternative would largely depend on whether the visitor views the park as primarily a “cultural,” “natural,” or “recreational” site. The park contains many types of resources, and people tend to value different resources with varying degrees of

intensity depending on individual preference. The beneficial and adverse impacts would be highly subjective depending on the individual visitor's opinions.

Alternative D is similar to the rehabilitation described in Alternative C, with approximately 350 acres to be cleared. Implementation of Alternative D would result in moderate short-term adverse impacts on all visitors during land disturbance activities. Moderate to major long-term beneficial impacts would occur on visitors interested in historic interpretation. Extensive tree clearing would enhance and expand current viewsheds of the battlefields. The new views would be adjacent to and similar in character to existing cleared areas. Negligible long-term beneficial impacts would occur on visitors using the park for recreation, as they may also appreciate the enhanced battlefield viewsheds. Minor to moderate long-term adverse impacts would occur on visitors who enjoy the forested aesthetic of the park.

As in Alternative C, the clearing of additional trees that obscure the view of the water battery from Fort Hill would result in minor short-term and long-term beneficial impacts on visitors interested in historic interpretation, negligible short-term and long-term beneficial impacts on visitors using the park for recreation, and minor short-term and long-term adverse impacts on visitors using the park for enjoying nature. Similarly, clearing trees to provide a view from the artillery placed at the South Fort park unit would result in minor short-term and long-term beneficial impacts on visitors interested in historic interpretation, negligible short-term and long-term beneficial impacts on visitors using the park for recreation, and negligible short-term and long-term adverse impacts on visitors using the park for enjoying nature. This clearing would allow visitors to visualize the avenues of approach that the South Fort park unit defended.

The replanting of 20 to 25 acres with native vegetation would result in negligible short-term adverse impacts during planting on all visitors, and negligible long-term beneficial impacts on all visitors. This replanting would allow screening of development in the adjacent areas, improving the park aesthetics.

The enhanced interpretation elements, including the Living History area improvements and new waysides, would result in minor short-term and long-term beneficial impacts on the park aesthetics for visitors interested in historic interpretation. Visitors interested in recreation activities or the natural environment would likely not note a change in aesthetics from these items, as the park already has a number of interpretive features. Aesthetic benefits to all park visitors would include the enhancement of visitor comfort from additional benches and shade trees. The additional exhibits within the park Visitor Center would likely not have an impact on the overall aesthetics of the park. The increase in ranger patrols for relic hunting would have no aesthetic impacts on visitors. The establishment of five new walking paths in rehabilitation areas would result in negligible short-term and long-term beneficial impacts on park aesthetics for all visitors.

Visitor Use and Experience

As noted in the aesthetics section above, the impacts on visitor use and experience associated with this alternative would largely depend on whether the visitor views the park as primarily a "cultural," "natural," or "recreational" site. The visitor experience of someone who is interested in historical interpretation may differ drastically from that of someone who is interested in viewing wildlife and enjoying the natural environment.

Implementation of Alternative D would result in moderate to major long-term beneficial impacts on visitors interested in historic interpretation. Those visitors would likely appreciate the expanded interpretation and enhanced visualization of the battlefields of the Vicksburg campaign. The forested areas would be replaced with a low ground cover that would not interfere with visitor visual access of the

enhanced areas. Tree clearing would occur in areas identified through military terrain analysis as key to the battle and siege tactics of Union and Confederate commanders, and to its understanding.

Interpretation would be provided to help visitors understand what happened within these modified areas. Negligible to minor beneficial impacts would occur on visitors using the park for recreation due to improved interpretation and the increased range of recreation activities available to visitors, although the loss of shade in some areas of the park may adversely impact these visitors. Moderate adverse impacts would occur on visitors using the park for enjoying nature if Alternative D were applied, due to the value those visitors may place on the forested areas proposed to be cleared. These visitors would be beneficially impacted by the addition of trails to the park's natural features.

The rehabilitation of 350 acres of landscape by clearing would result in moderate short-term adverse impacts from construction activities on all visitors. Moderate to major long-term beneficial impacts would result on visitors interested in historic interpretation. Minor long-term adverse impacts would result on visitors using the park for recreation due to the loss of shade. Moderate long-term adverse impacts would result on visitors using the park for enjoying nature.

Use of the cleared areas for additional Living History interpretation would result in minor short-term and long-term beneficial impacts on visitors interested in historic interpretation and negligible short-term and long-term beneficial impacts on visitors using the park for recreation or enjoying nature.

The clearing of trees that block the view of the water battery from Fort Hill would result in minor to moderate short-term and long-term beneficial impacts on visitors interested in historic interpretation, negligible short-term and long-term beneficial impacts on visitors using the park for recreation, and minor short-term and long-term adverse impacts on visitors using the park for enjoying nature.

Two new Shirley House waysides would result in minor short-term and long-term beneficial impacts on visitors interested in historic interpretation and negligible short-term and long-term beneficial impacts on visitors using the park for recreation or enjoying nature.

Tree thinning in limited specified areas along the tour road would result in minor short-term and long-term beneficial impacts on visitors interested in historic interpretation, negligible short-term and long-term beneficial impacts on visitors using the park for recreation, and negligible to minor short-term and long-term adverse impacts on visitors using the park for enjoying nature.

The 10 new interpretive waysides would result in minor short-term and long-term beneficial impacts on visitors interested in historic interpretation, and negligible short-term and long-term beneficial impacts on visitors using the park for recreation or enjoying nature. These waysides would provide visitors with a full understanding of battlefield events.

The clearing of trees from the margins of South Fort would result in minor to moderate short-term and long-term beneficial impacts on visitors interested in historic interpretation, negligible short-term and long-term beneficial impacts on visitors using the park for recreation, and minor short-term and long-term adverse impacts on visitors using the park for enjoying nature.

The replanting of 20 to 25 acres with native vegetation, the increase in ranger patrols for relic hunting, and 25 new benches in areas where visitors are encouraged to experience the park up close would result in negligible short-term and long-term beneficial impacts on all visitors.

The five new walking paths in rehabilitation areas would result in minor short-term and long-term beneficial impacts on visitors interested in historic interpretation, minor to moderate short-term and long-

term beneficial impacts on visitors using the park for recreation, and minor short-term and long-term beneficial impacts on visitors using the park for enjoying nature.

Cultural Resources

Cultural Landscape

Alternative D would result in moderate long-term beneficial impacts on cultural landscapes as establishment of open areas through and tree clearing and revegetation with turf grass or other groundcover would enhance preservation of cultural landscape features. By removing even more of the overlying, non-historical vegetative cover than in Alternative C, additional cultural landscape features (markers, monuments, trench lines, and natural ravines) are made visible. Once vegetation is removed, Vicksburg NMP staff would have an enhanced ability to detect and correct any erosion that occurs. The proposed alternative would have no adverse effect on NRHP-eligible cultural resources under Section 106 of the NHPA.

The rehabilitation of 350 acres of landscape by clearing would result in minor short-term adverse impacts from clearing activities and moderate long-term beneficial impacts as battlefields are open for viewing and interpretation.

Likewise, the clearing of additional trees that obscure the view of the water battery from Fort Hill, tree thinning along limited specified areas along the tour road, and clearing of trees to provide a view from the artillery placed at the South Fort park unit would result in minor short-term and long-term beneficial impacts by revealing the cultural landscape and allowing Vicksburg NMP staff to address erosion problems as they occur.

Use of the cleared areas for additional Living History interpretation and 25 new benches in areas where visitors are encouraged to experience the park up close would result in negligible short-term and long-term adverse impacts on cultural landscapes. Likewise, the 2 new Shirley House waysides and 10 new interpretive waysides would result in negligible short-term and long-term adverse impacts depending on their location within Vicksburg NMP. These elements are not historically accurate representations of the cultural landscape, and their inclusion may detract from the cultural landscape.

As in Alternative C, the replanting of 20 to 25 acres with native vegetation would result in negligible short-term and long-term beneficial impacts by minimizing intrusion into the cultural landscape from surrounding development outside the park.

The increase in ranger patrols for relic hunting would not result in impacts on the cultural landscape.

The establishment of five new walking paths in rehabilitation areas would result in negligible short-term and long-term beneficial impacts on the cultural landscape.

Impacts from actions contained in this alternative would not result in impairment of the cultural landscape in the park (see specific definition of “impairment” in the discussion of “Impairment Analysis Method” on page 4-2).

Historic Resources

Similar to Alternative C, implementation of Alternative D would result in minor to moderate long-term beneficial impacts on historic resources because historic features are protected under Alternative D, mainly as a result of improvement of the historic character of the Shirley House landscape. The proposed

alternative would have no adverse effect on NRHP-eligible cultural resources under Section 106 of the NHPA.

The rehabilitation of 350 acres of landscape by clearing would result in minor short-term adverse impacts during construction and moderate long-term beneficial impacts by restoring the historic viewsheds from existing historic areas of Vicksburg NMP. All of the other features of this alternative would be designed in such a way as to not directly impact any historic resources. There may be negligible adverse impacts during construction and/or clearing, but there would be no long-term adverse impacts on known historic resources.

The use of the cleared areas for additional Living History interpretation, 10 new interpretive waysides, replanting of 20 to 25 acres with native vegetation, and 25 benches in areas where visitors are encouraged to experience the park up close would not result in impacts on historic resources (assuming areas are not within the APE of historic resources).

The clearing of trees that block the view of the water battery from Fort Hill, tree thinning in limited specified areas along the tour road, and clearing of trees from the margins of South Fort would result in potential negligible short-term adverse impacts from cutting activity if areas were within the APE of historic resources, and no long-term impacts on historic resources.

The two new Shirley House waysides would result in negligible short-term and long-term adverse impacts from the presence of non-historic features in the APE.

The increase in ranger patrols for relic hunting would not result in impacts on historical resources.

The five new walking paths in rehabilitation areas would result in negligible short-term and long-term adverse impacts from construction and placement within the historic viewshed if the trails are within the APE.

Impacts from actions contained in this alternative would not result in impairment of historic resources in the park (see specific definition of “impairment” in the discussion of “Impairment Analysis Method” on page 4-2).

Archeological Resources

The rehabilitation of 350 acres of landscape by clearing would result in potential minor short-term adverse impacts from ground disturbance (assuming no significant archeological sites are disturbed), and potential minor long-term adverse impacts due to making potential archeological sites more readily accessible. NPS cultural resources personnel would conduct site surveys before, during, and after the project to ensure that archeological resources are protected. Protocols would be established to address the procedures to be followed if archeological resources are discovered during land-clearing activities. The two potential archeologically significant sites identified in 1997 are not located within the proposed rehabilitation areas for Alternative D. The proposed alternative would have no adverse effect on NRHP-eligible cultural resources under Section 106 of the NHPA.

The use of cleared areas for additional Living History interpretation, replanting of 20 to 25 acres with native vegetation, and 25 new benches in areas where visitors are encouraged to experience the park up close would result in potential negligible short-term adverse impacts from tree planting (assuming no significant archeological sites are disturbed), and no long-term impacts. The clearing of trees that block the view of the water battery from Fort Hill, tree thinning in limited specified areas along the tour road,

and clearing of trees from the margins of South Fort would not result in impacts on archeological resources, assuming there is no associated soil disturbance.

As described in Alternative C, the rehabilitation of the Shirley House landscape would result in potential negligible short-term adverse impacts from ground disturbance around the Shirley House. As described above, NPS cultural resources personnel would conduct site surveys before, during, and after the project to ensure that archeological resources are protected. No long-term impacts on archeological resources from this activity are expected.

The 10 new interpretive waysides and 5 new walking paths in rehabilitation areas would result in potential negligible short-term adverse impacts from ground disturbance (assuming no significant archeological sites are disturbed), and no long-term impacts.

The increase in ranger patrols for relic hunting would result in minor short-term and long-term beneficial impacts on archeological resources from minimizing disturbance.

Impacts from actions contained in this alternative would not result in impairment of archeological resources in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Natural Resources

Soils and Geologic Hazards

Alternative D would result in minor long-term beneficial impacts on soils and geologic hazards from larger cleared areas due to decreased potential for erosion. Impacts on soils would be detectable, and impacts on soil characteristics and erosion rates would be small.

The rehabilitation of 350 acres of landscape by clearing would result in minor short-term adverse impacts during construction, assuming proper BMPs are followed, and minor long-term beneficial impacts on soils and geologic hazards due to decreased erosion. Sod-forming grasses, such as Bermuda grass, act to hold loess soil in place by virtue of its highly fibrous root system (Appendix H). Thus, erosion of the cultural landscape would be reduced, and any gullies that form would immediately be visible and could be attended to before they become injurious. Alternative D recognizes that areas remain that were historically cleared but may not be feasible to clear today due to the potential for severe soil erosion.

Use of the cleared areas for additional Living History interpretation, tree thinning in limited specified areas along the tour road, increasing ranger patrols for relic hunting, and 25 new benches in areas where visitors are encouraged to experience the park up close would result in no impacts on soils and geologic hazards.

Clearing trees blocking the view from Fort Hill, 2 new Shirley House waysides, 10 new interpretive waysides, clearing trees from the margins of South Fort, replanting of 20 to 25 acres with native vegetation, and 5 new walking paths in rehabilitation areas would result in negligible short-term adverse impacts during construction, assuming proper BMPs are followed, and no long-term impacts on soils and geologic hazards. Impacts on soils would be below or at the lower levels of detection. Any impact on soil characteristics and erosion rates would be slight and would return to pre-existing conditions shortly after project implementation activities.

Impacts from actions contained in this alternative would not result in impairment of soils and geologic resources in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Air Quality and Temperature

Implementation of Alternative D would result in minor long-term adverse impacts on local air quality from increased localized temperatures and emissions from maintenance equipment.

The rehabilitation of 350 acres of landscape by clearing would result in minor short-term adverse impacts on air quality and temperature from construction equipment, and potential negligible long-term adverse impacts on air quality and temperature from tree removal. Construction activities such as the operation of diesel engines and land clearing have short-term adverse impacts on air quality. Impacts on air quality would be measurable, although the changes would be small and short-term, and the impacts would be localized, temporary, and limited to sensitive resources. Tree removal may result in increased local air temperature. Maximum mid-day air temperature reductions due to the presence of trees are in the range of 0.04^{o}C to 0.2^{o}C per percent canopy cover increase. The reduced air temperature resulting from the abundance of trees can improve air quality because the emission of many pollutants and/or ozone-forming chemicals is temperature-dependent (USDA, 2008). The adverse impacts on air quality due to tree removal would be below or at the lower levels of detection. Any impact on air quality would be slight and short-term, and air quality would be expected to return to pre-existing conditions shortly after the alternative has been implemented.

Use of the cleared areas for additional Living History interpretation and 25 new benches in areas where visitors are encouraged to experience the park up close would result in no short-term impacts and negligible long-term beneficial impacts from tree plantings.

Clearing trees blocking the view from Fort Hill, tree thinning in limited specified areas along the tour road, and clearing trees from the margins of South Fort would result in potential negligible short-term and long-term adverse impacts on air quality and temperature from vegetation removal (less shade and more greenhouse gases).

The 2 new Shirley House waysides and 10 new interpretive waysides would result in negligible short-term adverse impacts on air quality and temperature from construction equipment, potential negligible long-term adverse impacts from tree clearing during construction, and potential negligible beneficial impacts from tree plantings.

Replanting of 20 to 25 acres with native vegetation would result in potential negligible short-term and long-term beneficial impacts on air quality and temperature from tree planting (more shade and fewer greenhouse gases).

Increase in ranger patrols for relic hunting would result in potential negligible short-term and long-term adverse impacts on air quality and temperature from the additional use of vehicles.

The five new walking paths in rehabilitation areas would result in negligible short-term adverse impacts on air quality and temperature from construction equipment, and no long-term impacts.

Impacts from actions contained in this alternative would not result in impairment of air resources in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Surface Water Quality and Streamflow Characteristics

Implementation of Alternative D would result in minor long-term adverse impacts on water quality due to the removal of vegetative buffers, and minor long-term adverse impacts on water quantity and streamflow because of increased runoff from removal of vegetation. Three intermittent streams would be impacted as a result of land clearing. The removal of vegetation during construction activities would create exposed soil and cause additional erosion, which could cause increased sedimentation in surface waters. Stormwater runoff would be controlled through implementation of BMPs to minimize impacts on water quality. An appropriate stormwater permit prior to construction would need to be obtained from MDEQ. The removal of vegetation would result in loss of stream cover, resulting in elevated surface water temperatures, and reduction in organic matter input. Organic matter is a food source for members of the benthic community in streams, and loss of this food source could result in impacts on aquatic fauna in higher trophic levels. Stream siltation and turbidity would improve with the establishment of sod-forming grasses on the formerly wooded streambanks, since the grass would tend to hold the loess soil in place better than the forest root system.

The rehabilitation of 350 acres of landscape by clearing would result in minor short-term adverse impacts on water quality during construction, assuming proper BMPs are followed, and minor to moderate long-term adverse impacts on water quality and quantity as a result of increased runoff from vegetation removal.

Use of the cleared areas for additional Living History interpretation, clearing trees blocking the view from Fort Hill, tree thinning in limited specified areas along the tour road, clearing trees from the margins of South Fort, increase in ranger patrols for relic hunting, and 25 new benches in areas where visitors are encouraged to experience the park up close would not result in impacts on surface water quality and streamflow characteristics.

The 2 new Shirley House waysides and 10 new interpretive waysides would not result in impacts on surface water quality and streamflow characteristics (assuming proper BMPs are used during construction).

The replanting of 20 to 25 acres with native vegetation would have no short-term impacts and would result in negligible long-term beneficial impacts on water quality and quantity.

The five new walking paths in rehabilitation areas would result in negligible short-term adverse impacts during construction, assuming proper BMPs are followed, and no long-term impacts on surface water quality and streamflow characteristics.

Impacts from actions contained in this alternative would not result in impairment of water resources in the park (see specific definition of “impairment” in the discussion of “Impairment Analysis Method” on page 4-2).

Wetlands

Implementation of Alternative D would result in moderate long-term adverse impacts on wetland areas from clearing and removal of vegetation in wetlands and/or conversion of 97 acres of forested wetlands to scrub-shrub or emergent wetlands, especially along Durden Creek and tributaries to Mint Spring Bayou and Glass Bayou. Impacts on wetlands would be observable over a relatively large area, would be long-term, and would require a USACE 404 permit and appropriate mitigation measures.

The rehabilitation of 350 acres of landscape by clearing would result in moderate short-term and long-term moderate adverse impacts on wetlands as a result of their conversion from forested to scrub-shrub and emergent wetlands. Potential impacts on wetlands from battlefield rehabilitation would involve clearing vegetation from 97 acres of forested wetland. Within a 50-foot buffer along streams (25 feet on each side), trees taller than 15 feet would be removed, while trees shorter than 15 feet would remain. This 50-foot streambank buffer would be replanted with native species as necessary to maintain woody vegetation along the streambanks. Vegetation in the buffer would be maintained at a maximum height of 15 feet using commercial pruning and trimming equipment. Outside the 50-foot streambank buffer, wetland areas would be replanted with low-growing native grasses. Native woody vegetation would be allowed to naturally repopulate this area but would be maintained to a maximum height of 15 feet.

The Wetland SOF identified several measures that would mitigate potential wetland impacts under the preferred alternative (Alternative C), but did not specifically address mitigation measures for Alternative D. However, similar mitigation measures would need to be implemented for Alternative D, but the size of these mitigation areas would be increased accordingly to account for the larger potential impact on wetlands under Alternative D. These mitigation measures would include the following:

- After clearing, 97 acres of stream corridor and palustrine wetland in the impacted areas outside the 50-foot streambank buffer would be replanted with native grasses. Woody vegetation would be allowed to naturally regenerate in this area but would be maintained at a maximum height of 15 feet using commercial pruning and trimming equipment. Privet and other exotic species control in these areas would be conducted to avoid re-introduction of invasive species.

- A 50-foot buffer (25 feet per side) of native scrub-shrub vegetation would be maintained at a 15-foot height or less along impacted stream corridors. Within the 50-foot streambank buffer, trees taller than 15 feet would be removed, while trees shorter than 15 feet would remain. The 50-foot streambank buffer would be replanted with native species as necessary to maintain woody vegetation along the streambanks. Vegetation in this area would be maintained at a maximum height of 15 feet using commercial pruning and trimming equipment. Native species to be replanted include those noted in Appendix C.

- A total of 0.2 acre of wetland currently maintained in herbaceous vegetation along Union Avenue downslope from the Michigan Monument would be replanted with native plant species. This area, cleared more than 30 years ago and currently maintained as a grassed field, would be allowed to return to a forested wetland. Species to be replanted include those noted in Appendix C.

- Approximately 0.5 acre of a 1.16-acre parcel containing “dry bayou,” a natural spring that has been disturbed by development, would be restored by removing debris, removing non-native vegetation, and replanting with native wetland plant species noted in Appendix C. The spring is adjacent to Vicksburg National Cemetery and was disturbed during construction of commercial facilities on the parcel. Vicksburg NMP acquired the “dry bayou” property in 2003.

- The park would eradicate exotic plants on approximately 194 acres of forested wetlands in the Mint Spring and Glass Bayou watersheds. Privet and other invasive exotics would be removed from these areas.

As for Alternative C, replacement of the wetland forest with a maintained scrub-shrub forest with a maximum canopy height of 15 feet would diminish some functional values in this area. The 50-foot buffer along streams would be cleared of exotic vegetation and vegetation taller than 15 feet, while other vegetation would remain within the 50-foot streambank buffer. Streams would no longer be shaded by

mature trees, potentially resulting in elevated water temperatures during and after construction. A reduction in the amount of organic plant material entering the stream ecosystem may occur with the removal of larger trees. Removal of the larger trees would reduce the opportunity for adding large woody debris to the stream channels, which is an important component of a healthy stream system (Kovalenko and Dibble, 2007).

As with many of the riparian areas within the park, the wetlands in this area have become dominated by Chinese privet, an invasive species that the park is attempting to control. Clearing in this area would allow for the removal of privet and the re-establishment of native wetland and riparian species within the cleared areas.

None of the other proposed features of this alternative are proposed to be constructed in wetlands.

The 2 new Shirley House waysides, 10 new interpretive waysides, replanting of 20 to 25 acres with native vegetation, and 5 new walking paths in rehabilitation areas would result in no impacts on wetlands (assuming the areas are not located within a wetland).

Impacts from actions contained in this alternative would not result in impairment of wetland resources in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Vegetation

Implementation of Alternative D would result in moderate long-term adverse impacts on vegetation due to clearing and conversion of forested woodlands to open meadow systems. As for Alternative C, the primary landcover for the open meadow systems is currently assumed to be turf grass or native grasses, although it may be possible in steeply sloped areas and ravines to vary the landcover management to include less frequent mowing, burning, and the use of meadow species rather than Bermuda grass or other turf grasses requiring frequent mowing. Bermuda grass, native grasses and forbs, and other groundcovers would be considered for establishment on newly cleared areas. Change would occur to the native plant community over a relatively large area that would be readily measurable in terms of abundance, distribution, quantity, or quality.

The rehabilitation of 350 acres of landscape by clearing would result in moderate short-term and long-term adverse impacts on vegetation due to the conversion of forested to maintained meadow. Change would occur to the native plant community over a relatively large area that would be readily measurable in terms of abundance, distribution, quantity, or quality.

The use of the cleared areas for additional Living History interpretation and 25 new benches would result in no short-term impacts and negligible long-term beneficial impacts on vegetation due to tree plantings. Individual native plants may occasionally be impacted, but measurable or perceptible changes in plant community size, integrity, or continuity would not occur.

Clearing the trees blocking the view from Fort Hill, tree thinning in limited specified areas along the tour road, clearing trees from the margins of South Fort, and five new walking paths in rehabilitation areas would result in negligible short-term and long-term adverse impacts on vegetation due to vegetation removal. Individual native plants may occasionally be impacted, but measurable or perceptible changes in plant community size, integrity, or continuity would not occur.

The 2 new Shirley House waysides and 10 new interpretive waysides would result in no short-term impacts, potential negligible long-term adverse impacts due to tree clearing during construction, and

potential negligible beneficial impacts on vegetation due to tree plantings. Individual native plants may occasionally be impacted, but measurable or perceptible changes in plant community size, integrity, or continuity would not occur.

The replanting of 20 to 25 acres with native vegetation would result in negligible short-term adverse impacts during planting from equipment disturbance, and minor long-term beneficial impacts on vegetation due to the conversion of meadow/maintained areas to native forest vegetation. Impacts on native plants would be measurable or perceptible, but would be localized within a small area.

The increase in ranger patrols for relic hunting would have no impacts on vegetation.

Implementation of Alternative D would result in beneficial impacts from removal of invasive species during clearing and the application of BMPs to control invasive species. Invasives removal as part of the wetland mitigation plan and the replanting of 20 to 25 acres with native vegetation would result in minor short-term and long-term beneficial impacts from removal of invasive species.

Impacts from actions contained in this alternative would not result in impairment of vegetation resources in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

Wildlife and Habitat

Implementation of Alternative D would result in minor to moderate long-term beneficial impacts on locally sensitive floral species that currently use park meadows.

The rehabilitation of 350 acres of landscape by clearing would result in moderate long-term and short-term adverse and/or beneficial impacts due to the conversion of forested habitat to meadows and edge habitat. Adverse impacts would occur on wildlife and habitat as a result of the conversion of forested area to cleared area. Impacts would be specific to the wildlife that primarily inhabit the forested areas of the park (Appendix F). Forest species are reliant upon woodland resources to successfully survive and reproduce. Neotropical songbirds, in particular, use the thickly wooded ravine and ridge habitat preserved in the park. Beneficial impacts would also occur on wildlife and habitat as a result of the conversion of forested area to cleared area. Land clearing within the project area would create additional edge-transitional habitat. A quality habitat contains structural and compositional heterogeneity, which provides for microhabitats and food sources that support species diversity. Wildlife and habitat would be enhanced as a result of the interspersion of woods and open areas. These impacts on wildlife or habitat would result in a readily measurable change to terrestrial wildlife populations or habitat over a relatively large area.

Similar to Alternative C, the conversion of forested wetland to native grasses and scrub-shrub areas may alter the faunal community that uses the area, but would do so at a greater scale because of the additional clearing proposed under Alternative D. Wildlife that prefer forested wetlands would relocate to other adjacent areas that remain forested, while species that prefer open or scrub-shrub wetland habitats would utilize the new habitats. The loss of mature trees would eliminate canopy cover, nesting, and food sources used by some wildlife species. During the short-term transition period immediately after tree removal, the reduced canopy cover would likely increase soil and water temperatures, which may be harmful to fish, reptiles, amphibians, and other water-dependent wildlife. However, because the streams in this area are ephemeral and intermittent, the impacts on aquatic fauna utilizing this area are expected to be minimal. During the short-term transition period, there may be increased potential for erosion of exposed soils.

Use of the cleared areas for additional Living History interpretation, 5 new walking paths in rehabilitation areas, and 25 new benches in areas where visitors are encouraged to experience the park up close would result in potential negligible long-term and short-term adverse impacts on wildlife and habitat. The impacts would potentially occur due to the increase in human presence associated with the elements of Alternative D. These potential impacts would not be measurable or of perceptible consequence to wildlife populations.

Clearing the trees blocking the view from Fort Hill, tree thinning in limited specified areas along the tour road, and clearing of trees from the margins of South Fort would result in potential negligible short-term adverse impacts during implementation, and no long-term impacts. Adverse impacts would potentially occur on wildlife and habitat as existing vegetation is removed. These potential impacts would not be measurable or of perceptible consequence to wildlife populations.

The 2 new Shirley House waysides and 10 new interpretive waysides would result in potential negligible short-term adverse impacts during construction and potential negligible long-term adverse impacts from the disturbance of wildlife due to the presence of humans in the area. These potential impacts would not be measurable or of perceptible consequence to wildlife populations.

The replanting of 20 to 25 acres with native vegetation would result in minor long-term and short-term adverse and/or beneficial impacts due to the conversion of meadows and edge habitat to forest. These minor impacts would be specific to the wildlife that mainly inhabit cleared areas of the park (Appendix F). Impacts on wildlife or habitat would be measurable or perceptible, but localized within a small area.

The increase in ranger patrols for relic hunting would have no impacts on wildlife and habitat. No new disturbance would occur to wildlife and habitat as a result of this element of Alternative D.

Impacts from actions contained in this alternative would not result in impairment of wildlife resources and habitat in the park (see specific definition of “impairment” in the discussion of “Impairment Analysis Method” on page 4-2).

Species of Concern

Implementation of Alternative D would result in negligible to minor long-term adverse impacts on protected species that utilize forested habitats in the park, and negligible to minor long-term beneficial impacts on protected species that utilize meadow habitats in the park. Alternative D would reduce the acreage of forested areas of the park and increase the acreage of meadows in the park.

The rehabilitation of 350 acres of landscape by clearing would result in potential minor to moderate short-term and long-term beneficial impacts on prairie nymph habitat. Prairie nymph prefer the meadow habitat that would be created by the 350 acres of landscape clearing and would potentially colonize the areas that are proposed to be cleared under Alternative D.

Alternative D would result in the clearing of one area that supports American bittersweet, an MNHP species of special concern (MNHP, 2006). Before clearing activities, known locations of the vine would be determined, and species would be transplanted to other forested areas of similar habitat types within Vicksburg NMP, if possible.

Use of the cleared areas for additional Living History interpretation, 2 new Shirley House waysides, 10 new interpretive waysides, replanting of 20 to 25 acres with native vegetation, 5 new walking paths in rehabilitation areas, and 25 new benches in areas where visitors are encouraged to experience the park up

close would result in potential minor short-term and long-term adverse impacts on the prairie nymph. If the prairie nymph occurs in these areas, impacts on species of concern would be measurable or perceptible, but localized within a small area. The mortality of an individual might occur, but the viability of populations would not be impacted, and the community, if left alone, would recover.

Clearing trees blocking the view from Fort Hill and clearing trees from the margins of South Fort would result in potential negligible short-term and long-term beneficial impacts on prairie nymph habitat if the species is present.

Tree thinning in limited specified areas along the tour road and increasing ranger patrols for relic hunting would not result in impacts on species of concern.

Impacts from actions contained in this alternative would not result in impairment of species of concern in the park (see specific definition of "impairment" in the discussion of "Impairment Analysis Method" on page 4-2).

NPS Operations and Facilities

Long-term Management and Sustainability of Resources

Similar to Alternative C, implementation of Alternative D would result in minor to moderate long-term adverse impacts on park operations for maintenance of cleared areas.

The rehabilitation of 350 acres of landscape by clearing would result in minor short-term adverse impacts on park operations from construction activities, and minor to moderate long-term impacts on park operations due to maintenance of cleared areas. Additionally, some park operations would be easier and more effective after clearing, such as monitoring for erosion and park patrols.

The use of the cleared area for additional Living History programs, rehabilitation of the Shirley House landscape, tree thinning along 3 miles of the tour road, 10 new interpretive waysides, 5 new walking paths in rehabilitation areas, and 25 benches in areas with shade trees along pull-outs would result in negligible short-term and long-term adverse impacts on park operations from construction and maintenance.

The clearing of trees that obscure the view from Fort Hill, clearing of trees to provide a view from the artillery placed at the South Fort park unit, replanting of 20 to 25 acres with native vegetation, and increase in ranger patrols for relic hunting would result in minor short-term and long-term adverse impacts on park operations from construction and maintenance.

CUMULATIVE IMPACTS

CEQ's regulations require assessment of cumulative impacts in the decision-making process for federal projects. "Cumulative impacts" are defined as the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions (40 CFR 1508.7). Cumulative impacts are evaluated for all alternatives, including the no action alternative. The cumulative impacts analysis of this EA considers the past, present, and reasonably foreseeable future actions on land use that could add to (intensify) or offset (compensate for) the impacts on the resources examined by the various alternatives. Cumulative impacts vary by resource, and the geographic area considered here is the park as a whole. In some instances, activities may result in both negative and positive impacts when considering the short and long terms.

Projects that could have cumulative impacts when combined with the impacts from the implementation of the CLR recommendations are described in Section 1.

Recreational Resources, Aesthetics, and Visitor Experience

Recreational Resources

The park's past, current, and ongoing activities enhance Vicksburg's recreational resources. Most of the other projects proposed for the park described in Section 1, including transportation, erosion control, restoration, and other maintenance projects, would provide negligible beneficial impacts on recreation.

Also, other opportunities for recreational resources are located in the park vicinity. The City of Vicksburg Parks and Recreation Department is charged with providing quality recreational facilities to the citizens of Vicksburg. The department maintains 15 playgrounds, 8 baseball fields, 2 youth softball fields, 3 adult softball fields, 1 Olympic-size pool, and 10 tennis courts. Activities include baseball (spring and fall), softball, basketball, arts programs, volleyball, swimming, flag football, lifeguard certification, umpire clinics, and playground activities (City of Vicksburg, 2008c).

For all the alternatives, the proposed activities would combine with the beneficial and adverse impacts on visitors, depending upon their viewpoints. Combined with those activities available in Vicksburg NMP, the overall cumulative impacts from Alternative A would be negligible. The overall cumulative impacts from Alternatives B, C, and D would primarily be beneficial, but would depend on the individual's visitation goals and personal values. The cumulative impacts from implementation of Alternative B would remain negligible, while the cumulative impacts from implementation of Alternatives C and D would be beneficial and negligible to minor.

Aesthetics

Most of the other projects described in Section 1 proposed for the park, including transportation, erosion control, restoration, and other maintenance projects, would result in negligible to minor impacts on aesthetics. The park is managed for a variety of visitor experiences, and this project and other projects in the park would not result in major changes to park aesthetics. The overall park aesthetic remains a military battlefield park.

For all the alternatives, the proposed activities would combine with the beneficial and adverse impacts on visitors, depending upon their viewpoints. Planned, current, and past transportation-related projects total approximately 50 acres of disturbance, though most of the disturbance area would be within the existing roadway and generally would involve activity within the existing pavement area. Erosion control projects have been conducted on approximately 2 acres over the past several years. Battlefield restoration and rehabilitation projects have been or are planned to be conducted on approximately 34 acres. Other previously conducted or proposed activities, including replacement and addition of waysides, modifications or repairs to structures, and limited vegetation trimming, are generally limited in size and scope. Combined with those activities available in Vicksburg NMP, the overall cumulative impacts from Alternative A would be negligible to minor adverse. The overall cumulative impacts from Alternative B would primarily be beneficial and negligible to minor, but would depend on the individual's visitation goals and personal values. The overall cumulative impacts from Alternative C would depend on the individual's visitation goals and personal values, but would range from moderate beneficial impacts on visitors interested in historic interpretation to minor adverse impacts on visitors using the park to enjoy nature. Similarly, the overall cumulative impacts from Alternative D would also depend on the individual's visitation goals and personal values, but would range from moderate to major beneficial

impacts on visitors interested in historic interpretation to moderate adverse impacts on visitors using the park to enjoy nature.

Visitor Use and Experience

The management of battlefield landscapes would recognize the primacy of those historic resources identified in each park's enabling legislation—those resources that are at the heart of the visitor experience and the core of the park's preservation efforts. Transportation improvements, erosion control projects, and battlefield restoration projects are anticipated to beneficially impact visitor use and experience. These impacts would be minor to moderate beneficial. Transportation projects (totaling approximately 10 miles and approximately 50 acres of disturbance, mostly within the existing roadway) would enhance the tour road. Erosion control projects (approximately 2 acres) were designed to help address the impact of erosion so that visitors would be able to understand the siege of 1863. The battlefield restoration projects (approximately 34 acres) provide a better understanding of the battle.

The implementation of the alternatives in association with other ongoing or planned activities in the park would result in cumulative impacts on visitor use and experience. Currently, visitors experience a park landscape that is approximately 1,250 acres forested and 550 acres cleared. Four acres are undergoing natural revegetation within the South Loop, while the park is clearing 3,600 linear feet of marker/monument/trench line trails.

Alternative A would contribute a long-term minor adverse impact because visitors would continue to misinterpret the existing cultural landscape. However, this would not change the overall minor to moderate beneficial cumulative impact on visitors using the park for historic interpretation. Alternative A would have no additional impacts on visitors using the park for recreation or for enjoying nature.

Alternative B would contribute a long-term minor to moderate beneficial impact on visitors using the park for historic interpretation, and a negligible beneficial impact on visitors using the park for recreation and for enjoying nature. This results in an overall minor to moderate beneficial cumulative impact on all park visitors, depending on their visitation goals.

Alternative C would contribute a long-term moderate beneficial impact on visitors using the park for historic interpretation, a negligible to minor beneficial impact on visitors using the park for recreation resources, and a minor adverse impact on visitors using the park for enjoying nature. This results in an overall moderate beneficial cumulative impact on all park visitors, depending on their visitation goals. Implementation of Alternative C would result in 640 cleared acres and 1,160 forested acres.

Alternative D would add a moderate to major beneficial impact on visitors using the park for historic interpretation, a negligible to minor beneficial impact on visitors using the park for recreation, and a moderate adverse impact on visitors using the park for enjoying nature. This results in an overall moderate beneficial cumulative impact on all park visitors, depending on their visitation goals. Implementation of Alternative D would result in 900 cleared acres and 900 forested acres.

Cultural Resources

Cultural Landscapes

The park tour road transportation projects (totaling approximately 50 acres, mostly within the existing roadway) would potentially impact the cultural landscape. This impact would be minor, long-term, and adverse. Erosion control projects have adversely impacted the cultural landscape in the past. However, current park management focuses on improving the visitor's experience of the cultural landscape, and the

recent 2 acres of erosion control activity was designed to protect park resources. The battlefield rehabilitation projects (approximately 34 acres) have or would beneficially impact the cultural landscape by attempting to restore the park to its wartime setting. These cumulative impacts would result in a minor to moderate beneficial impact on the overall cultural landscape at the park.

The implementation of the alternatives would result in cumulative impacts on the park's cultural landscape by influencing the ratio of wooded to non-wooded acres throughout the park. Approximately 1,250 acres are forested, and 550 acres are cleared. Four acres are undergoing natural revegetation within the South Loop, while the park is clearing 3,600 linear feet of marker/monument/trench line trails. Vicksburg NMP recently acquired 4.5 acres that is being kept or restored to a wooded condition.

Alternative A would contribute a negligible to minor adverse impact on the cultural landscape. However, this would not change the overall minor to moderate beneficial cumulative impacts.

Alternative B would add a negligible to minor beneficial impact, resulting in an overall minor to moderate beneficial cumulative impact. Alternative B would result in the modification of 30 additional acres of vegetation due to the three 10-acre sites where BMPs would be implemented. These sites may be forested, cleared, or mixed depending on the results of the consultation with local experts.

Alternative C would add a minor to moderate beneficial impact, resulting in an overall moderate beneficial cumulative impact. Implementation of Alternative C would result in 640 cleared acres and 1,160 forested acres.

Alternative D would add a moderate beneficial impact, resulting in an overall moderate beneficial cumulative impact. Implementation of Alternative D would result in 900 cleared acres and 900 forested acres.

None of the proposed alternatives would cumulatively result in adverse effects on NRHP-eligible cultural resources under Section 106 of the NHPA.

Historic Resources

Proposed park projects could affect historic resources, either adversely or beneficially. The park tour road transportation projects (totaling approximately 10 miles and approximately 50 acres of disturbance, mostly within the existing roadway) would potentially have adverse impacts on historic resources by introducing non-historic elements into historic areas, or disturbing historic features. These impacts would be minor, long-term, and adverse. Erosion control projects have adversely impacted historic resources in the past. However, current park management and projects work to preserve and protect historic resources at the park, and the recent 2 acres of erosion control activity was designed to protect park resources. The battlefield rehabilitation projects (approximately 34 acres) have or would beneficially impact historic resources by attempting to restore the park to its wartime setting. These cumulative impacts would result in a minor to moderate beneficial impact on historic resources at the park.

Alternative A would add a negligible impact on the overall moderate beneficial cumulative impacts, as existing park management and features would be maintained. However, this would not change the overall cumulative minor to moderate beneficial impact on historic resources at the park.

Alternative B would add a negligible adverse impact on the overall moderate beneficial cumulative impacts. However, this would not change the overall cumulative minor to moderate beneficial impact on historic resources at the park.

Alternatives C and D would add a minor beneficial impact on the overall moderate beneficial cumulative impacts. This would result in an overall cumulative minor to moderate beneficial impact on historic resources at the park.

None of the proposed alternatives would cumulatively result in adverse effects on NRHP-eligible cultural resources under Section 106 of the NHPA.

Archeological Resources

Proposed park projects could affect archeological resources, either adversely or beneficially. The approximately 10 miles of park tour road transportation projects could have adverse impacts on archeological resources by potentially disturbing archeological features. These impacts would be minor, long-term, and adverse. Erosion control projects have adversely impacted archeological resources in the past. However, current park management and the approximately 2 acres of erosion control projects work to preserve and protect archeological resources at the park. Past battlefield rehabilitation projects have not impacted archeological resources. Proposed battlefield rehabilitation projects would not impact known archeological resources. If archeological resources are discovered during land-clearing activity, appropriate BMPs would be utilized to avoid, reduce, and mitigate any disturbances. These cumulative impacts would result in a minor beneficial impact on archeological resources at the park.

Alternative A would add a negligible impact onto the overall minor beneficial cumulative impacts, because existing park management and features would be maintained. This would result in an overall cumulative minor beneficial impact on archeological resources at the park.

Alternative B would add a negligible adverse impact onto the overall minor beneficial cumulative impacts. However, this would not change the overall cumulative minor beneficial impact on archeological resources at the park.

Alternatives C and D would add a minor adverse impact onto the overall minor beneficial cumulative impacts because cleared areas may have a higher likelihood for disturbance by relic hunters. However, this would not change the overall cumulative minor beneficial impact on archeological resources at the park.

None of the proposed alternatives would cumulatively result in adverse effects on NRHP-eligible cultural resources under Section 106 of the NHPA.

Natural Resources

Soils and Geologic Hazards

Proposed park projects could affect soils or geological resources in the park. Erosion control projects consisting of planting a forest within 2 acres of the park were intended to beneficially impact soils. These projects have created moderate adverse impacts because exposed tree roots channel the water from runoff, causing additional erosion. Transportation projects are intended to address poor road conditions along 10 miles of roadway due to erosion and age, and moderate beneficial impacts are anticipated. Battlefield restoration projects (approximately 34 acres) were anticipated to create moderate beneficial impacts by restoring battlefields to their wartime condition, which would remove trees that have caused erosion within the park. The implementation of the proposed alternatives would result in cumulative impacts on the park's soils by influencing the ratio of wooded to non-wooded acres, and thus the differential erosion rates between the two landscape types.

Alternative A would contribute a minor adverse component. However, this would not change the overall cumulative moderate beneficial impact.

Alternative B would contribute a negligible to minor beneficial component, resulting in an overall cumulative moderate beneficial impact.

Alternatives C and D, in conjunction with other park projects, would add a minor beneficial component to the overall cumulative impacts, resulting in an overall cumulative moderate beneficial impact.

Air Quality and Temperature

Proposed park projects could result in cumulative impacts on air quality resources or values. Impacts on air quality in the Vicksburg and Warren County area include industrial and agricultural practices that emit pollutants and particulate matter, and automobiles. Fires, both wild and prescribed, contribute to some temporary deterioration in air quality and visibility. Battlefield restoration projects on approximately 34 acres have removed forested lands from specific areas within the park. Ten miles of proposed transportation projects may create short-term additional impacts on air quality during construction activities. Erosion control projects created additional forested areas (approximately 2 acres) within the park, which created a beneficial impact on air quality. The cumulative impact from these projects would be adverse and negligible to minor.

Alternative A, in conjunction with other projects, would not add to the overall cumulative impacts, resulting in an overall cumulative negligible to minor adverse impact.

Alternative B, in conjunction with other projects, would add a negligible beneficial component to the overall cumulative impacts. However, this would not change the overall cumulative negligible to minor adverse impact.

Alternative C, in conjunction with other projects, would add a negligible to minor adverse component to the overall cumulative impacts, resulting in an overall cumulative negligible to minor adverse impact.

Alternative D, in conjunction with other projects, would add a minor adverse component to the overall cumulative impacts, resulting in an overall cumulative minor adverse impact.

Surface Water Quality and Streamflow Characteristics

Proposed park projects could result in cumulative impacts on surface water and streamflow resources. Erosion control projects on approximately 2 acres were intended to beneficially impact water resources in the park. Over time, these projects have adversely impacted water resources by increasing stormwater runoff. This impact is minor in intensity. Transportation improvement projects along approximately 10 miles of park roads would adversely impact water resources in the short term due to construction-related activities. These impacts are anticipated to be minor. Battlefield restoration and reforestation projects on approximately 34 acres are anticipated to beneficially impact water resources. Minimal impacts have occurred on water resources from past wildfires and suppression efforts. The cumulative impact from other projects would be adverse and negligible to minor.

Alternative A, in conjunction with other projects, would not add to the overall cumulative impacts, resulting in an overall cumulative negligible to minor adverse impact.

Alternative B, in conjunction with other projects, would add a negligible beneficial component to the overall cumulative impacts. However, this would not change the overall cumulative negligible to minor adverse impact.

Alternative C, in conjunction with other projects, would add a minor adverse component to the overall cumulative impacts, resulting in an overall cumulative negligible to minor adverse impact.

Alternative D, in conjunction with other projects, would add a minor adverse component to the overall cumulative impacts, resulting in an overall cumulative minor adverse impact.

Wetlands

Proposed transportation improvement projects might result in negligible adverse impacts on wetlands in the short term due to construction-related activities along 10 miles of roadway; however, these projects are not anticipated to create direct impacts on wetlands because construction would occur within the current footprint of the roads. Erosion control projects (totaling 2 acres), which entailed planting trees, were intended to beneficially impact wetlands by decreasing erosion and sedimentation within the park; however, over time these projects may have adversely impacted wetlands by increasing erosion/sedimentation and stormwater runoff. This impact is minor in intensity. Past battlefield rehabilitation projects have had negligible to minor impacts on wetlands. Proposed battlefield rehabilitation projects may also have negligible to minor impacts on wetlands.

Alternative A would add a negligible adverse component to the overall negligible adverse cumulative impacts, because existing park management and features would be maintained. This would result in an overall cumulative negligible adverse impact on wetlands in the park.

Alternative B would add a negligible beneficial component to the overall negligible adverse cumulative impacts. However, this would not change the overall cumulative negligible adverse impact on wetlands in the park.

Alternative C would add a minor adverse impact to the overall negligible adverse cumulative impacts. This would result in an overall cumulative minor adverse impact on wetlands in the park. Mitigation for the proposed wetland impacts is detailed in the Wetland SOF included as Appendix D.

Alternative D would add a moderate adverse impact to the overall negligible adverse cumulative impacts. This would result in an overall cumulative minor to moderate adverse impact on wetlands in the park. Mitigation for the proposed wetland impacts under Alternative C is detailed in the Wetland SOF included as Appendix D. It would be expected that similar wetland mitigation would be required for Alternative D.

Vegetation

Proposed park projects could result in cumulative impacts on vegetation resources. Battlefield restoration projects (approximately 34 acres) have removed forested lands from specific areas within the park and revegetated these areas with native grasses. Proposed transportation projects (approximately 10 miles and 50 acres) are not anticipated to create impacts on vegetation because construction would occur within the current footprint of the roads. Erosion control projects (approximately 2 acres) created additional forested areas within the park to combat the impacts of erosion, which created a beneficial impact on vegetation. These projects would result in a cumulative negligible adverse impact on vegetation.

Battlefield restoration projects would result in the removal of invasive/exotic species from the cleared areas. Proposed transportation and erosion control projects would also result in the removal of exotics within the project area. These projects would result in a cumulative minor beneficial impact on vegetation from exotics removal.

Alternative A, in conjunction with other projects, would not add to the overall cumulative impacts, resulting in an overall cumulative negligible adverse impact.

Alternative B, in conjunction with other projects, would add a negligible to minor beneficial component to the overall cumulative impacts, resulting in an overall cumulative negligible beneficial impact.

Alternative C, in conjunction with other projects, would add a minor adverse component to the overall cumulative impacts, resulting in an overall cumulative minor adverse impact.

Alternative D, in conjunction with other projects, would add a minor adverse component to the overall cumulative impacts, resulting in an overall cumulative minor adverse impact.

The implementation of Alternative B, C, or D would result in impacts on the park's vegetation by influencing the ratio of wooded to non-wooded acres. Currently, there are approximately 1,250 forested acres and 550 cleared acres. Four acres are currently undergoing natural revegetation within the South Loop, while the park is in the process of clearing 3,600 linear feet of marker/monument/trench line trails. Vicksburg NMP recently acquired 4.5 acres that is being kept or restored to a wooded condition. At the same time, 1.6 acres would be affected by bluff stabilization activities below the Vicksburg National Cemetery wall in the Mint Spring Bayou ravine. Alternative B would result in the modification of 30 additional acres of vegetation due to the three 10-acre sites where BMPs would be implemented. These sites may be forested, cleared, or mixed depending on the results of the consultation with local experts. Implementation of Alternative C would result in 640 cleared acres and 1,160 forested acres. Implementation of Alternative D would result in 900 cleared acres and 900 forested acres.

Wildlife and Habitat

Battlefield restoration projects (approximately 34 acres) have removed forested lands from specific areas within the park and revegetated these areas with native grasses. Transportation projects (approximately 10 miles and 50 acres) have not created and are not anticipated to create impacts on wildlife and habitat because construction occurred within the current footprint of the roads. Erosion control projects (approximately 2 acres) have created additional forested areas within the park to combat the impacts of erosion, which created a beneficial impact on wildlife and habitat.

Proposed and ongoing transportation projects in the Vicksburg and Warren County areas include the widening of the Yazoo River Diversion Canal to accommodate the river traffic supporting the Port of Vicksburg, and a Mississippi Department of Transportation project. Two options are emerging during an environmental review in progress for a road connecting U.S. 61 North and the Port of Vicksburg. One route begins approximately 5 miles north of River Region Medical Center, cutting through hills and bluffs and ending near the intersection of North Washington Street and Sherman Avenue. Another would widen North Washington Street between U.S. 61 and the port, an option laden with challenges including purchasing rights-of-way now held by residents of the Kings Community and excavating historic markers.

Proposed and ongoing commercial and industrial development in the Vicksburg and Warren County areas are occurring on property that has already been cleared for such use (Vicksburg-Warren County Chamber of Commerce, personal communication, 2008). Anderson Tully, a lumber company in Vicksburg,

manages forest along the Mississippi River and is unaware of any proposed or ongoing development in the Vicksburg and Warren County area that would include tree clearing. The Tensas River National Wildlife Refuge is 35 miles west of Vicksburg in Madison Parish, Louisiana. The refuge consists of 70,000 acres of bottomland hardwoods and oxbow lakes (USFWS, 2008).

EO 13186 requires that federal agencies examine the impacts of their proposed actions on migratory birds and their habitat. The park is located in prime migratory bird habitat along the Mississippi flyway. Neotropical songbirds, in particular, use the thickly wooded ravine and ridge habitat preserved in the park. The implementation of Alternatives B, C, or D would result in cumulative impacts on the wildlife and habitat of the park by influencing the ratio of wooded to cleared acres, thus impacting where a particular animal species may be found.

Cumulatively, activities inside and outside the park not related to the proposed alternatives would result in a negligible adverse impact on wildlife and habitat. Alternative A, in conjunction with other projects, would add a negligible component, resulting in an overall cumulative negligible adverse impact.

Alternative B, in conjunction with other projects, would add a negligible to minor beneficial component to the overall cumulative impacts, resulting in an overall cumulative negligible beneficial impact.

Alternative C, in conjunction with other projects, would add a minor adverse component to the overall cumulative impacts, resulting in an overall cumulative negligible to minor adverse impact.

Alternative D, in conjunction with other projects, would add a minor to moderate adverse component to the overall cumulative impacts, resulting in an overall cumulative minor adverse impact.

Species of Concern

As described above for wildlife and habitat, battlefield restoration projects have removed forested lands from specific areas within the park and revegetated these areas with native grasses. Sensitive floral species in the park prefer these open-grassed areas. Transportation projects have not created and are not anticipated to create impacts on species of concern because construction occurred within the current footprint of the roads. Erosion control projects have created additional forested areas within the park to combat the impacts of erosion, which created a beneficial impact on species of concern. The overall cumulative impacts on species of concern from other projects are expected to be negligible and beneficial.

Alternative A, in conjunction with other projects, would add a negligible beneficial component, resulting in an overall cumulative negligible beneficial impact.

Alternative B, in conjunction with other projects, would add a negligible beneficial component to the overall cumulative impacts, resulting in an overall cumulative negligible beneficial impact.

Alternatives C and D, in conjunction with other projects, would add a negligible to minor adverse impact on species of concern that might utilize park woodlands, and would add a negligible to minor beneficial impact on species of concern that would utilize park meadows. The overall cumulative impacts would be negligible and beneficial.

NPS Operations and Facilities

Long-term Management and Sustainability of Resources

The proposed project would not result in significant cumulative impacts on park operations. Proposed projects within the park could create negligible to minor adverse impacts on management from the allocation of resources that could be used elsewhere. The park would require additional staff and equipment for the implementation of Alternatives B, C, and D.

Alternative A, in conjunction with other projects, would not add to the overall cumulative impacts, resulting in an overall cumulative negligible to minor adverse impact.

Alternative B, in conjunction with other projects, would add a minor adverse component to the overall cumulative impacts on park operations for maintenance of BMPs and additional interpretive technology, resulting in an overall cumulative minor adverse impact.

Alternatives C and D, in conjunction with other projects, would add a minor to moderate adverse impact on park operations from expansion of the mowing and burning maintenance activities and increased areas to patrol. The overall cumulative impacts would be minor to moderate and adverse.

5. CONSULTATION AND COORDINATION

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APPENDIX A

EARLY COORDINATION NOTIFICATIONS AND RESPONSES

United States Department of the Interior

NATIONAL PARK SERVICE
VICKSBURG NATIONAL MILITARY PARK
3201 Clay Street
Vicksburg, MS 39183-3495
(601) 636-0583

October 5, 2007

Mr. Bill Anoatubby
Governor, Chickasaw Nation
P.O. Box 1548
Ada, OK 74821

Dear Mr. Anoatubby:

Reference: Vicksburg National Military Park Cultural Landscape Report and Environmental Assessment

Subject: Tribal Consultation and Coordination

The National Park Service (NPS) is preparing a Cultural Landscape Report and an Environmental Assessment to address rehabilitation of battlefields at Vicksburg National Military Park in Vicksburg, Mississippi. NPS is currently in the process of developing the scope of these rehabilitation activities.

Restoration of some additional historically open areas that once dominated the view shed within the park will enhance visitor understanding and appreciation of the intricacies of siege operations at Vicksburg, as required by the enabling legislation and specified in the Park General Management Plan and Interpretive Prospectus.

In accordance with NEPA, we are eliciting your comments and invite you to review the project. Please contact us by November 5, 2007 with your initial concerns and comments.

If you have questions or concerns, or need additional information, please contact me by writing at the letterhead address above. We would also be happy to arrange a meeting with you at your convenience to discuss this project. Please contact me through my email address, monika_mayr@nps.gov, or by telephone at 601-619-2902.

We look forward to receiving your input on this project.

Sincerely,

Monika Mayr

Monika Mayr
Superintendent

Enclosures

United States Department of the Interior

NATIONAL PARK SERVICE
VICKSBURG NATIONAL MILITARY PARK
3201 Clay Street
Vicksburg, MS 39183-3495
(601) 636-0583

October 5, 2007

Mr. Hank Holmes
Director, Mississippi Department of Archives and History
P.O. Box 571
Jackson, MS 39205-0571

Dear Mr. Holmes:

Reference: Vicksburg National Military Park Cultural Landscape Report and Environmental Assessment

Subject: Compliance with Section 106 of the National Historic Preservation Act and National Environmental Policy Act (NEPA)

The National Park Service (NPS) is preparing a Cultural Landscape Report and an Environmental Assessment to address rehabilitation of battlefields at Vicksburg National Military Park in Vicksburg, Mississippi. NPS is currently in the process of developing the scope of these rehabilitation activities.

Restoration of some additional historically open areas that once dominated the view shed within the park will enhance visitor understanding and appreciation of the intricacies of siege operations at Vicksburg, as required by the enabling legislation and specified in the Park General Management Plan and Interpretive Prospectus. A newsletter is enclosed that describes present conditions and provides a comment form.

In accordance with NEPA and 36 CFR 800 requirements, we are eliciting your comments and invite you to review the project. Please contact us by November 5, 2007 with your initial concerns and comments. An Environmental Assessment will be prepared and will be sent to you for comment after that date.

If you have questions or concerns, or need additional information, please contact me by writing at the letterhead address above. We would also be happy to arrange a meeting with

you at your convenience to discuss this project. Please contact me through my email address, monika_mayr@nps.gov, or by telephone at 601-619-2902.

We look forward to receiving your input on this project.

Sincerely,

Monika Mayr
Superintendent

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United States Department of the Interior

NATIONAL PARK SERVICE
VICKSBURG NATIONAL MILITARY PARK
3201 Clay Street
Vicksburg, MS 39183-3495
(601) 636-0583

October 5, 2007

Mr. Homer L. Wilkes
State Conservationist
NRCS
Suite 1321, Federal Building
100 West Capitol Street
Jackson, MS 39269

Dear Mr. Wilkes:

Reference: Vicksburg National Military Park Cultural Landscape Report and Environmental Assessment

Subject: Early Coordination and Compliance with the National Environmental Policy Act (NEPA)

The National Park Service (NPS) is preparing a Cultural Landscape Report and an Environmental Assessment to address rehabilitation of battlefields at Vicksburg National Military Park in Vicksburg, Mississippi. NPS is currently in the process of developing the scope of these rehabilitation activities.

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Monika Mayr

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Superintendent

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United States Department of the Interior

NATIONAL PARK SERVICE
VICKSBURG NATIONAL MILITARY PARK
3201 Clay Street
Vicksburg, MS 39183-3495
(601) 636-0583

October 5, 2007

Mr. Charlie Morgan
State Forester
Mississippi Forestry Commission
301 North Lamar Street, Suite 300
Jackson, MS 39201

Dear Mr. Morgan:

Reference: Vicksburg National Military Park Cultural Landscape Report and Environmental Assessment

Subject: Early Coordination and Compliance with the National Environmental Policy Act (NEPA)

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We look forward to receiving your input on this project.

Sincerely,

Monika Mayr
Superintendent

Enclosures

United States Department of the Interior

NATIONAL PARK SERVICE
VICKSBURG NATIONAL MILITARY PARK
3201 Clay Street
Vicksburg, MS 39183-3495
(601) 636-0583

October 5, 2007

Mr. Ron Nassar
Project Leader
U.S. Fish and Wildlife Service
2524 South Frontage Road, Suite C
Vicksburg, MS 39180-5269

Dear Mr. Nassar:

Reference: Vicksburg National Military Park Cultural Landscape Report and Environmental Assessment

Subject: Current List of Federally Listed Threatened and Endangered Species

The National Park Service (NPS) is preparing a Cultural Landscape Report and an Environmental Assessment to address rehabilitation of battlefields at Vicksburg National Military Park in Vicksburg, Mississippi. NPS is currently in the process of developing the scope of these rehabilitation activities.

Restoration of some additional historically open areas that once dominated the view shed within the park will enhance visitor understanding and appreciation of the intricacies of siege operations at Vicksburg, as required by the enabling legislation and specified in the Park General Management Plan and Interpretive Prospectus. A newsletter is enclosed that describes present conditions and provides a comment form.

In accordance with NEPA requirements, we are eliciting your comments and invite you to review the project. We also request a current list of federally listed threatened or endangered species, species of concern, or any other special status species that might occur in the locality mentioned above, and designated critical habitats, if any, for these species. Please contact us by November 5, 2007 with your initial concerns and comments. An Environmental Assessment will be prepared and will be sent to you for comment after that date.

This letter will serve as a record that the NPS is initiating informal consultation with your agency pursuant to the requirements of the 1973 Endangered Species Act, as amended, and 2001 NPS Management Policies.

If you have questions or concerns, or need additional information, please contact me by writing at the letterhead address above. We would also be happy to arrange a meeting with you at your convenience to discuss this project. Please contact me through my email address, monika_mayr@nps.gov, or by telephone at 601-619-2902.

We look forward to receiving your input on this project.

Sincerely,

Monika Mayr
Superintendent

Enclosures

United States Department of the Interior

NATIONAL PARK SERVICE
VICKSBURG NATIONAL MILITARY PARK
3201 Clay Street
Vicksburg, MS 39183-3495
(601) 636-0583

October 5, 2007

Ms. Trudy Fisher
Executive Director
Mississippi Department of Environmental Quality
P.O. Box 20305
Jackson, MS 39289-1305

Dear Ms. Fisher:

Reference: Vicksburg National Military Park Cultural Landscape Report and Environmental Assessment

Subject: Early Coordination and Compliance with the National Environmental Policy Act (NEPA)

The National Park Service (NPS) is preparing a Cultural Landscape Report and an Environmental Assessment to address rehabilitation of battlefields at Vicksburg National Military Park in Vicksburg, Mississippi. NPS is currently in the process of developing the scope of these rehabilitation activities.

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Monika Mayr
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NATIONAL PARK SERVICE
VICKSBURG NATIONAL MILITARY PARK
3201 Clay Street
Vicksburg, MS 39183-3495
(601) 636-0583

October 5, 2007

Ms. Christine Norris
Tribal Chief, Jena Band of Choctaw Indians
P.O. Box 14
Jena, LA 71342

Dear Ms. Norris:

Reference: Vicksburg National Military Park Cultural Landscape Report and Environmental Assessment

Subject: Tribal Consultation and Coordination

The National Park Service (NPS) is preparing a Cultural Landscape Report and an Environmental Assessment to address rehabilitation of battlefields at Vicksburg National Military Park in Vicksburg, Mississippi. NPS is currently in the process of developing the scope of these rehabilitation activities.

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United States Department of the Interior

NATIONAL PARK SERVICE
VICKSBURG NATIONAL MILITARY PARK
3201 Clay Street
Vicksburg, MS 39183-3495
(601) 636-0583

October 5, 2007

Mr. Gregory E. Pyle
Chief, Choctaw Nation of Oklahoma
P.O. Drawer 1210
Durant, OK 74702

Dear Mr. Pyle:

Reference: Vicksburg National Military Park Cultural Landscape Report and Environmental Assessment

Subject: Tribal Consultation and Coordination

The National Park Service (NPS) is preparing a Cultural Landscape Report and an Environmental Assessment to address rehabilitation of battlefields at Vicksburg National Military Park in Vicksburg, Mississippi. NPS is currently in the process of developing the scope of these rehabilitation activities.

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We look forward to receiving your input on this project.

Sincerely,

Monika Mayr

Monika Mayr
Superintendent

Enclosures

United States Department of the Interior

NATIONAL PARK SERVICE
VICKSBURG NATIONAL MILITARY PARK
3201 Clay Street
Vicksburg, MS 39183-3495
(601) 636-0583

October 5, 2007

Ms. Brenda Dardar-Robichaux
Chief, United Houma Nation
20986 Hwy. 1
Golden Meadow, LA 70357

Dear Ms. Dardar-Robichaux:

Reference: Vicksburg National Military Park Cultural Landscape Report and Environmental Assessment

Subject: Tribal Consultation and Coordination

The National Park Service (NPS) is preparing a Cultural Landscape Report and an Environmental Assessment to address rehabilitation of battlefields at Vicksburg National Military Park in Vicksburg, Mississippi. NPS is currently in the process of developing the scope of these rehabilitation activities.

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Monika Mayr
Superintendent

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NATIONAL PARK SERVICE
VICKSBURG NATIONAL MILITARY PARK
3201 Clay Street
Vicksburg, MS 39183-3495
(601) 636-0583

October 5, 2007

Mr. Veasley Denson
Chief, Mississippi Band of Choctaw Indians
P.O. Box 6010
Choctaw, MS 39350

Dear Mr. Denson:

Reference: Vicksburg National Military Park Cultural Landscape Report and Environmental Assessment

Subject: Tribal Consultation and Coordination

The National Park Service (NPS) is preparing a Cultural Landscape Report and an Environmental Assessment to address rehabilitation of battlefields at Vicksburg National Military Park in Vicksburg, Mississippi. NPS is currently in the process of developing the scope of these rehabilitation activities.

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We look forward to receiving your input on this project.

Sincerely,

Monika Mayr
Superintendent

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United States Department of the Interior

NATIONAL PARK SERVICE
VICKSBURG NATIONAL MILITARY PARK
3201 Clay Street
Vicksburg, MS 39183-3495
(601) 636-0583

October 5, 2007

Mr. Bob Strader
Supervisory Wildlife Biologist
Jackson Migratory Bird Field Office
U.S. Fish and Wildlife Service
6578 Dogwood View Parkway, Suite B
Jackson, MS 39213

Dear Mr. Strader:

Reference: Vicksburg National Military Park Cultural Landscape Report and Environmental Assessment

Subject: Current List of Federally Listed Threatened and Endangered Species

The National Park Service (NPS) is preparing a Cultural Landscape Report and an Environmental Assessment to address rehabilitation of battlefields at Vicksburg National Military Park in Vicksburg, Mississippi. NPS is currently in the process of developing the scope of these rehabilitation activities.

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We look forward to receiving your input on this project.

Sincerely,

Monika Mayr
Superintendent

Enclosures

United States Department of the Interior

NATIONAL PARK SERVICE
VICKSBURG NATIONAL MILITARY PARK
3201 Clay Street
Vicksburg, MS 39183-3495
(601) 636-0583

October 5, 2007

Mr. Ray Aycock
Field Supervisor
U.S. Fish and Wildlife Service - Mississippi Ecological Services Field Office
6578 Dogwood View Parkway, Suite A
Jackson, Mississippi 39213

Dear Mr. Aycock:

Reference: Vicksburg National Military Park Cultural Landscape Report and Environmental Assessment

Subject: Current List of Federally Listed Threatened and Endangered Species

The National Park Service (NPS) is preparing a Cultural Landscape Report and an Environmental Assessment to address rehabilitation of battlefields at Vicksburg National Military Park in Vicksburg, Mississippi. NPS is currently in the process of developing the scope of these rehabilitation activities.

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We look forward to receiving your input on this project.

Sincerely,

Monika Mayr
Superintendent

Enclosures

United States Department of the Interior

NATIONAL PARK SERVICE
VICKSBURG NATIONAL MILITARY PARK
3201 Clay Street
Vicksburg, MS 39183-3495
(601) 636-0583

October 5, 2007

USGS State Representative
308 South Airport Road
Pearl, MS 39208

Dear Sir/Madam:

Reference: Vicksburg National Military Park Cultural Landscape Report and Environmental Assessment

Subject: Early Coordination and Compliance with the National Environmental Policy Act (NEPA)

The National Park Service (NPS) is preparing a Cultural Landscape Report and an Environmental Assessment to address rehabilitation of battlefields at Vicksburg National Military Park in Vicksburg, Mississippi. NPS is currently in the process of developing the scope of these rehabilitation activities.

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We look forward to receiving your input on this project.

Sincerely,

Monika Mayr
Superintendent

Enclosures

United States Department of the Interior

NATIONAL PARK SERVICE
VICKSBURG NATIONAL MILITARY PARK
3201 Clay Street
Vicksburg, MS 39183-3495
(601) 636-0583

October 5, 2007

Mr. Earl Barbry, Sr.
Chairman, Tunica-Biloxi Tribe
P.O. Box 1589
Marksville, LA 71351

Dear Mr. Barbry:

Reference: Vicksburg National Military Park Cultural Landscape Report and Environmental Assessment

Subject: Tribal Consultation and Coordination

The National Park Service (NPS) is preparing a Cultural Landscape Report and an Environmental Assessment to address rehabilitation of battlefields at Vicksburg National Military Park in Vicksburg, Mississippi. NPS is currently in the process of developing the scope of these rehabilitation activities.

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We look forward to receiving your input on this project.

Sincerely,

Monika Mayr
Superintendent

Enclosures

Va—
For your files
Thx,
M-

DEPARTMENT OF THE ARMY

VICKSBURG DISTRICT, CORPS OF ENGINEERS
4155 CLAY STREET
VICKSBURG, MISSISSIPPI 39183-3435

REPLY TO
ATTENTION OF:

October 12, 2007

Operations Division

SUBJECT: Early Coordination and Compliance with the National Environmental Policy Act

Ms. Monika Mayr
National Park Service
Vicksburg National
Military Park
3201 Clay Street
Vicksburg, Mississippi 39183-3495

Dear Ms. Mayr:

We received your correspondence, subject as above, on October 12, 2007. While we are working diligently to reply to you in a timely manner, please be aware this office is experiencing an unusually heavy workload at this time. For ease of reference, we assigned your correspondence the identification number MVK-2007-1140. Please refer to this number should you write or call us about your request.

If you have any questions about the status of your request, please call this office at (601) 631-5064 or (601) 631-7071.

Sincerely,

Kenneth P. Mosley
Regulatory Branch

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mississippi Field Office
6578 Dogwood View Parkway, Suite A
Jackson, Mississippi 39213

October 22, 2007

Ms. Monika Mayr
Superintendent
National Park Service
Vicksburg National Military Park
3201 Clay Street
Vicksburg, Mississippi 39183-3495

Dear Ms. Mayr:

The U.S. Fish and Wildlife Service (Service) has received your request dated October 5, 2007, for information regarding the potential presence of federally listed species on the Vicksburg National Military Park in Warren County, Mississippi. Our comments are submitted in accordance with the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.).

The threatened bald eagle (*Haliaeetus leucocephalus*) is the only species of sea eagle regularly occurring on the North American continent. The bald eagle is predominantly a winter migrant in the southeast; however, increasing occurrences of nesting have been observed. The bald eagle nests in the transitional area between forest and water. They construct their nests in dominant living pines or bald cypress trees. Eagles often use alternate nests in different years with nesting activity beginning between September and January of each year. Young are usually fledged by midsummer.

The bald eagle was officially removed from the List of Endangered and Threatened Species as of August 8, 2007; however, it continues to be protected under the Migratory Bird Treaty Act (40 Stat. 755, as amended; 16 U.S.C. 703 et seq.), and the Bald and Golden Eagle Protection Act (54 Stat. 250, as amended, 16 U.S.C. 668a-d). Should any of the proposed project activities be located near an active bald eagle nest, we recommend that construction activities be conducted in accordance with the Service's National Bald Eagle Guidelines (www.fws.gov)

If you have any additional questions, please feel free to contact this office, telephone: (601) 321-1132.

Sincerely,

Kathy W. Lunceford
Fish and Wildlife Biologist

APPENDIX B

BMPS FOR CULTURAL LANDSCAPE RESTORATION

PROPOSED BMPS FOR BATTLEFIELD REHABILITATION

The lists below highlight major categories of actions being proposed in this Environmental Assessment and applicable Best Management Practices (BMPs). These BMPs are largely based on the Mississippi Forestry Commission's document titled Mississippi's BMPs: Best Management Practices for Forestry in Mississippi and the Forest Stewardship Council (FSC) Regional Forest Certification Standard for the Mississippi River Alluvial Valley and Gulf Coastal Plan. Additional BMPs pertaining to invasive species and archeological resources are also described.

Both of these documents are available online at:

http://www.mfc.state.ms.us/pdf/Mgt/WQ/Entire_bmp_2008-7-24.pdf
http://www.fscus.org/images/documents/2006_standards/mav_working_3.3.pdf

ACTIONS RELATED TO TREE THINNING, LIMBING AND REMOVAL

Both of the referenced guides suggest that preharvest planning is one of the keys to preventing soil erosion and sedimentation. Careful planning of road locations, logging, harvesting practices, and watercourse protection are recommended. To avoid non-point pollution problems such as excessive sediments, organic debris, chemicals, nutrients, and an increase in average water temperature, the guide recommends the establishment of streambank buffers, which are vegetated areas adjacent to streams and watercourses that help protect them from pollutants. The residual vegetation acts as a filter to trap sediments, chemicals, and nutrients before they reach the water. Some of this vegetation along perennial streams also provides the shade necessary to avoid adverse changes in water temperature.

For the battlefield rehabilitation, streambank buffers will be utilized to minimize and mitigate impacts to wetland areas. Within a 50-foot buffer along streams (25 feet on each side), trees over 15 feet tall would be removed, while trees less than 15 feet tall would remain. This 50-foot streambank buffer would be replanted with native species as necessary to maintain woody vegetation along the streambanks. Vegetation in this area would be maintained at a maximum height of 15 feet using commercial pruning and trimming equipment. Outside of the 50-foot streambank buffer, wetland areas would be replanted with low-growing native grasses. Native woody vegetation would be allowed to naturally repopulate this area but maintained to a maximum height of 15 feet.

The principals associated with streambank buffers within the guidelines include:

1. Never use a stream channel as a skid trail or road.
2. Remove logging debris from stream channels.
3. Minimize the number of stream crossing points.
4. Cross streams only at a right angle.
5. Never block the flow of water through a stream channel.
6. Avoid rutting through streams.
7. Avoid high intensity fire in streambank buffers.
8. Minimize residual tree damage.

9. Harvest of any stems on the edge of a stream channel must be accomplished in such a manner as to minimize impact to the stream bank.

Streambank buffers are areas that extend from both stream banks to a distance determined by the slope of the land. The streambank buffers are designed to trap sediments so are recommended to be thicker as the steepness of the adjacent slope increases due to the associated increased velocity of overland stormwater flow. The intent of streambank buffers is also to maintain sufficient overstory and understory crown cover to provide shade, maintain bank stability, and protect water quality. Additional benefits include enhancing wildlife habitat, creating wildlife corridors, and providing habitat diversity in harvested areas. Another topic addressed by the cited sources is the roads to be established to facilitate removal of cleared trees. These routes are referred to as skid trails and haul roads, and measures need to be put into place to control erosion associated with these constructed corridors. Skid trails are used for moving harvested materials from stump to landing.

They need to be designed to avoid potentially sensitive areas and problem soils and so that they drain properly. Skid trails also require maintenance if they are to retain an effective drainage system.

Haul roads are the primary roads used to transport harvested timber from a site. Like skid trails, haul roads need to sited to avoid potentially hazardous areas and problem soils, and designed to accommodate drainage to limit soil erosion. Haul roads should be constructed and used during dry periods as possible. These road surfaces will also require maintenance to avoid the development of ruts. Both road types should be revegetated after they are retired.

The referenced guides provide additional guidance on establishing water control methods in association with roads established to support tree clearing that are intended to reduce sedimentation from logging activities. The methods described include slash dispersal, revegetation, silt fences and hay bales, water bars, water turnouts, and broad-based drainage ditches.

Slash is debris created in the process of a logging operation. Slash dispersal is an immediate solution for preventing soil movement on an active logging site. Scatter slash over exposed soil or use it to build water bars.

Revegetation is using seed or mulch to protect trails, roads, or other exposed soil.

Silt fences and hay bales are erosion and sedimentation reducers. They can be used to stabilize exposed soil around stream crossings, or embedded roadways and trails.

Water bars are mounds of soil or placed wood to divert runoff water from the road.

Water turnouts are extensions of a drainage ditch into a vegetated area, providing for the dispersion and filtration of stormwater runoff.

<u>Tree Clearing</u>

1. Do not allow surface water runoff from any type of soil disturbance to run directly into a watercourse.

2. Maintain the integrity of all streambeds and banks. When it is necessary to alter a stream's course for any reason, return the streambed and banks, as near as possible, to their original condition.

3. Do not leave debris of any type (logging or inorganic) in streambeds.

4. Do not spray chemicals directly into water or allow chemicals, herbicides, fertilizers, or petroleum products to degrade surface or groundwater.

5. Leave streambank buffers along watercourses both to filter sediment from overland flow and to maintain the inherent, normal temperature of water in all streams and other bodies of water.

6. Provide for rapid revegetation of all denuded areas through natural processes supplemented by artificial revegetation where necessary.

Additional considerations derived from the FSC Regional Forest Certification Standard include:

- Guidelines shall be prepared and implemented to control erosion; to minimize forest damage during harvesting, road construction, and all other mechanical disturbances; and to protect water resources.

- Logging operations and construction of roads and skid trails are conducted only during periods of weather when soil is least susceptible to compaction, surface erosion, rutting, or sediment transport into streams and other bodies of water.

- Construction of skid trails is minimized.

- Felling and extraction are planned to minimize adverse effects on standing trees, ground cover, soil, and sensitive environmental features.

- Silvicultural techniques and logging equipment are selected according to slope, erosion-hazard rating, and/or risk of landslides in order to minimize soil disturbance and erosion, and avoid mass failure.

- Plans for site preparation specify the following mitigations to minimize impacts to the forest resources:

    - Slash is concentrated only as much as necessary to achieve the goals of site preparation and the reduction of fuels to moderate or low fire hazard levels.

    - Scarification of soils is limited to the minimum necessary to achieve successful regeneration of desired species.

- Removal and relocation of mineral and organic layers of soil is minimized during logging and site preparation.

- The transportation system is designed, constructed, maintained, and/or reconstructed to minimize the extent of the road network and its potential cumulative adverse effects.

<u>Access Trails and Roads</u>

- Follow BMP guidelines for access trails and roads.

- Use procedures which will promote the quick healing of skid trails (such as restoring the skid trails to their natural shape and grade, erosion and sediment controls, and replanting).

- Conduct skidder logging on the contour as much as possible.

- Skid uphill when skidding must be done against the contour.

Streambank Buffers

- Maintain the streambank buffers between harvest areas and watercourses.
- Mechanical site preparation should remain outside of the streambank buffers
- Within the 50-foot buffer, trees taller than 15 feet would be removed, while trees shorter than 15 feet would remain. Vegetation in the buffer would be maintained at a maximum height of 15 feet using commercial pruning and trimming equipment. Removal activities would occur by hand within the streambank buffers.

Logging Debris

- Avoid introducing organic debris into streams, which can alter the natural temperature and oxygen content of the water. Debris can also alter the natural flow, or movement, of the stream, which may lead to increased sedimentation in the stream.
- Remove tree tops and other logging debris from streams.

Equipment Maintenance

- Avoid spillage or discharge of petroleum products, antifreeze, and other maintenance materials, especially near streams and other bodies of water.
- Drain equipment fluids into containers and dispose of according to label directions.
- Dispose of all empty containers in the same manner.
- Report discharges or spills in accordance with the requirements of the Mississippi Department of Environmental Quality.

Landings and Concentration Yards

- Locate a landing or concentration yard on a site which will not present an erosion and subsequent siltation problem.
- Leave an adequate buffer zone between landings and watercourses.
- Landings and yards should have a slight slope to allow drainage.
- Provide for adequate drainage on approach roads so that road drainage water does not enter the landing area, causing muddy wet conditions.
- Provide for stabilization of landings immediately following the completion of operations.

Portable Sawmills and Sawdust

- Locate portable sawmills on reasonably level sites.

- Deposit sawdust on level ground.
- Divert runoff water around a sawdust pile by ditching.
- Locate sawdust piles at least 300 feet from streams.

Other Considerations

- Perform clearing or thinning operations in the fall and winter when fewer visitors are at the park, dormant trees are less likely to be damaged, there are no nesting birds or animals in the vegetation, and sufficient time would be available to remove ground vegetation before spring growth.
- The use of heavy vehicles should be minimized, and consideration should be paid to using low tire pressure vehicles.
- Operations should occur only when the soil is firm to reduce the degree of compaction.
- NPS would notify potential visitors (such as through the Park's website) of pending clearing operations.
- Stump removal in the cleared areas would be addressed as follows:
    - In areas where mechanical maintenance would not occur, stumps would remain in place
    - In areas where mowing or burning would occur, stumps would be removed. With stump removal, archeological surveys would be conducted after clearing.
- Remove felled trees without dragging, which gouges the ground surface.

ACTIONS RELATED TO ESTABLISHING NEW COVER (FOREST OR MEADOW)

Preparation for forest cover

- Road surfaces and landings should be smoothed and shaped to permit the use of conventional equipment for seedbed preparation, seeding, mulch application and maintenance.
- Culverts should be maintained or replaced with water bars or ditches adequate to carry the runoff.

Seedbed preparation

- The top layer of soil should be loosened by raking, disking or other acceptable means before seeding.
- Chisel or loosen compacted areas.
- Spread available topsoil over unfavorable soil conditions.
- When conventional seeding is to be done, no preparation is required providing the soil material is loose (i.e., on a fresh skid trail) and has not been sealed by rainfall.

- On smooth, cut slopes or compacted trails the surface will require pitting, trenching or scarifying to provide a place for seed to lodge and germinate.

- Incorporate lime and/or fertilizer into the top 3 to 4 inches of soil as a part of seedbed preparation when practical.

- Selecting the proper plant species suitable to the soil and seasonal condition is vital to establishing an effective vegetative cover. Appendix C contains a list of native tree species that would be considered for the reforestation effort.

Seeding

- Inoculate legume seed with proper inoculant before planting.

- Apply seed uniformly by broadcasting with a cyclone seeder or close drilling.

- Normal depth for covering seed ranges from ¼ inch for ryegrass to 1 inch for small grain.

- When seed is applied with a hydraulic applicator, firming the soil is not necessary.

Tree Planting

- Tree planting by hand causes little, if any, erosion.

- Tree planting by machine may temporarily cause erosion. The plow point and coulter blade on the planting machine creates a planting slit in which a seedling is placed. The slit is closed around the seedling by the planter's packing wheels, which may create a depression on each side of the slit. The depressions may channel surface water runoff, thus creating an erosion problem. To avoid ditch formation, machine planting should follow the contour of the site.

Lime and Fertilizer

- For the establishment of vegetation such as grasses and/or legumes, apply lime and fertilizer as needed for the species to be planted.

INVASIVE PLANT SPECIES CONTROL

Herbicide Application

The use of herbicides should be carefully planned and applied to prevent the contamination of streams and lakes, which may damage fish and other aquatic life:

- The herbicide applicator will provide documentation of training/certification in herbicide application.

- Choose an herbicide registered for intended uses and suitable for use on target species.

- Herbicides should also be suitable and safe for use with available methods of application.

- Always use herbicides in accordance with label instructions.

- Store herbicides where there is no danger of being spilled or released into the environment.
- Do not mix chemicals near springs, streams and lakes.
- Since wind and high temperatures increase the chance of herbicide drift, volatilization and pollution of water and atmosphere, make sure that atmospheric conditions are such that a maximum amount of chemical reaches target species, especially during aerial or spray applications.
- Never apply herbicides directly to water (except when the chemical is approved for application over water).
- Clean chemical application equipment away from streams and other water sources.
- Dispose of excess herbicides and containers in accordance with label instructions.

Site Activity

- Do not allow the introduction of new invasive species into project areas (pits, construction etc)
- All individuals working, volunteering or recreating should clean mud, dirt, and plant parts off vehicles, pets, equipment and boots before going onto public lands.
- Use uninfested areas for staging, parking, and cleaning equipment.
- Keep active road construction sites that are in relatively invasive species free areas closed to vehicles that are not involved with construction.
- If possible, begin activities in uninfested areas before operating in infested areas. Clean equipment via equipment cleaning stations before moving to an invasive species free area.
- Minimize contact with roadside sources of invasive species seed and propagules that could be transported to other areas or restrict to those periods when spread of seed or propagules are least likely.
- Minimize soil disturbance and retain desirable vegetation in and around area to the maximum extent possible.
- Minimize the creation of sites suitable for invasive species establishment.
- Minimize removal of roadside vegetation during construction, maintenance, and other ground disturbing activities.

Post-construction and Follow-Up

- Quickly treat individual invasive species plants or small infestations before they become established, produce seeds, and are able to spread.
- Suppress the growth and/or reduce the reproductive capabilities of invasive species to slow or prevent their establishment.

- Use certified weed free mulch and hay.
- Use only invasive species free sand, gravel, topsoil, etc.
- Consider the use of invasive species free fiber roll barriers or sediment logs.
- Consider whether a site requires seeding to insure that disturbed soil does not optimize invasive plant establishment.
- Revegetate using plant materials that have a high likelihood of survival.
- Use locally native material including seed mixes, plugs, and sods where appropriate and available. Use certified invasive species free products.
- Use appropriate seeding guidelines and mixes and realize that many species previously recommended for this purpose now present invasive problems. Cross reference seeding list with list of known or potential invasive species.
- Consider the appropriate seed transfer zones for the native plants used in various restoration projects within – wildlife, fisheries, etc. and follow guidance regarding use of locally native plants in restoration.
- Consider carefully if fertilization is warranted, because addition of fertilizer will increase risk and degree of invasive species invasion.

Invasive Species Monitoring

- Include monitoring and treatment for invasive species in project maintenance programs.
- After a ground disturbing activity, monitor infested areas annually for at least three growing seasons following completion of activities and provide for follow up treatments based on inspection results.
- Monitor and evaluate the success of revegetation in relation to project plan

ARCHEOLOGICAL RESOURCE CONCERNS

For any ground-disturbing activities being carried out under any of the proposed actions, the following BMPs will be followed with regards to archeological resources:

- NPS will include an archeologist in the detailed implementation planning for any ground-disturbing action.
- If warranted (i.e., high expectation of significant artifacts exists), NPS will conduct subsurface testing at sites to be disturbed.
- To the extent possible, sites of ground-disturbing activities will be shifted, if needed, to avoid disturbing any identified resources. In wooded areas to be cleared, NPS may choose to leave a specific stand of trees intact where appropriate, to preserve the integrity of buried archeological resources.

- During ground-disturbing activities, a qualified archeologist will monitor the actions and will have the authority to halt the action as needed if archeological resources are encountered.

- Should unexpected resources be discovered, NPS will assess their significance before determining how to proceed. Available courses of action in such a situation would include:

    - Cessation of the construction action until the site can be properly documented and excavated;

    - Relocation/realignment of the action to allow the archeological materials to remain in place.

APPENDIX C

TREES TO BE CONSIDERED FOR REFORESTATION EFFORTS

Appendix C: Trees to be Considered for Reforestation Efforts

Vicksburg National Military Park Environmental Assessment for Landscape Rehabilitation

Common Name	Technical Name	Habitat	Proposed for Wetland Revegetation
Box Elder	*Acer negundo*	forested area on the edge of an open field	X
Red Maple	*Acer rubrum*	disturbed; open	X
Southern Sugar Maple	*Acer barbatum*	disturbed; roadside	
Smooth Sumac	*Rhus glabra*	disturbed; roadside	
Pawpaw	*Asimina triloba*	Mesic forest along small stream	
American Holly	*Ilex opaca*	disturbed; open	
Deciduous Holly	*Ilex decidua*	mesic wooded area	
Ironwood or Blue Beech	*Carpinus caroliniana*	disturbed; roadside;forested mesic north slope	X
Black Haw	*Viburnum prunifolium*	mesic forested north slope	
Elderberry	*Sambucus canadensis*	disturbed;roadside; east facing slope;	X
Rusty Black Haw	*Viburnum rufidulum*	on east slope; along small stream; in forest.	
Flowering Dogwood	*Cornus florida*	disturbed; open	
Rough-leaved Dogwood	*Cornus drummondii*	disturbed; mesic	
Eastern Red Cedar	*Juniperus virginiana*	disturbed; open	
Persimmon	*Diospyros virginiana*	disturbed; roadside;forested mesic north slope	
Black Locust	*Robinia pseudo-acacia*	disturbed; roadside	
Honey Locust	*Gleditsia triacanthos*	disturbed; roadside	
Redbud	*Cercis canadensis*	mesic forested north slope	
Beech	*Fagus grandifolia*	mesic north slope; on stream	
Black Oak	*Quercus velutina*	disturbed; roadside;mesic north slope	
Cherrybark Oak	*Quercus pagoda*	disturbed; open	X
Chinkapin Oak	*Quercus muehlenbergii*	on edge of mesic woods	
Northern Red Oak	*Quercus rubra*	north slope; mesic drainage; in forested area	
Shumard's Oak	*Quercus shumardii*	disturbed; open	
Southern Red Oak	*Quercus falcata*	forested area on the edge of an open field	
Water Oak	*Quercus nigra*	mesic wooded area	X
White Oak	*Quercus alba*	disturbed; open	

Appendix C: Trees to be Considered for Reforestation Efforts

Vicksburg National Military Park Environmental Assessment for Landscape Rehabilitation

Common Name	Technical Name	Habitat	Proposed for Wetland Revegetation
Sweetgum	*Liquidambar styraciflua*	disturbed; open	X
Witch-hazel	*Hamamelis virginiana*	mesic forested north slope	
American Hydrangea	*Hydrangea arborescens*	very mesic north slope	
Oak-leaved Hydrangae	*Hydrangea quercifolia*	mesic forested north slope	
Bitternut Hickory	*Carya cordiformis (Wang.)*	mesic wooded area	
Black Walnut	*Juglans nigra L.*	mesic wooded area	
Pecan	*Carya illinoinensis*	disturbed; open	
Sassafras	*Sassafras albidum*	disturbed; forest edge/drainage	
Spice-bush	*Lindera benzoin*	in mesic forested northwest slope	
Southern Magnolia	*Magnolia grandiflora*	mesic wooded area	X
Tulip Tree or Yellow Poplar	*Liriodendron tulipifera*	disturbed; open	X
Red Mulberry	*Morus rubra*	mesic wooded area	
White Ash	*Fraxinus cf. americana*	disturbed; open	
Loblolly Pine	*Pinus taeda*	disturbed; roadside	
Sycamore	*Platanus occidentalis*	disturbed; roadside	X
Carolina Buckthorn	*Frangula caroliniana*	mesic wooded area	
Carolina Laurel Cherry	*Prunus caroliniana*	Mesic forest along small stream	
Chickasaw Plum	*Prunus angustifolia*	disturbed; roadside	
Wild Black Cherry	*Prunus serotina*	disturbed; mesic	
Black Willow	*Salix nigra*	Mesic forest along small stream	X
Eastern Cottonwood	*Populus deltoides*	disturbed; roadside	
Southern Buckthorn	*Bumelia lycioides*	disturbed; roadside	
Bald Cypress	*Taxodium distichum*	disturbed; open	
Basswood	*Tilia americana*	north slope; mesic drainage; in forested area	
American Elm	*Ulmus americana*	disturbed; open	
Slippery Elm or Red Elm	*Ulmus rubra*	disturbed; roadside;forested mesic north slope	
Southern Hackberry	*Celtis laevigata*	disturbed; mesic	X
Winged Elm	*Ulmus alata*	disturbed; roadside	

APPENDIX D

DRAFT VICKSBURG NATIONAL MILITARY PARK CULTURAL LANDSCAPE REPORT AND ENVIRONMENTAL ASSESSMENT WETLANDS STATEMENT OF FINDINGS FOR EXECUTIVE ORDER 11990 (PROTECTION OF WETLANDS)

DRAFT

Vicksburg National Military Park

Environmental Assessment for Landscape Rehabilitation

Statement of Findings for Executive Order 11990
(Protection of Wetlands)

February 17, 2009

Prepared for the National Park Service, U.S. Department of the Interior

by

MACTEC Engineering and Consulting, Inc.

Kennesaw, Georgia

STATEMENT OF FINDINGS FOR EXECUTIVE ORDER 11990
(PROTECTION OF WETLANDS)

Vicksburg National Military Park
Environmental Assessment for Landscape Rehabilitation

Recommended:

_____ _____
Ms. Monika Mayr, Superintendent Date

Vicksburg National Military Park

Certified for Technical Adequacy and Servicewide Consistency:

_____ _____
Chief, Water Resources Division Date

Approved:

_____ _____
Mr. David Vela, Regional Director Date

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1. INTRODUCTION

The National Park Service (NPS) has prepared and is making available for public review a Cultural Landscape Report (CLR) and Environmental Assessment (EA) that sets forth the basic philosophy for managing land cover at Vicksburg National Military Park (NMP) and provides a framework for future decision making on this subject. Two of the alternatives considered in the EA would have adverse effects on wetlands. Accordingly, the NPS has prepared this Statement of Findings in compliance with the requirements of Executive Order (EO) 11990 ("Protection of Wetlands"), which requires the NPS and other Federal agencies to evaluate the likely impacts of their actions on wetlands.

Vicksburg NMP is located in Vicksburg, Warren County, Mississippi (Figure 1-1). The park consists of six noncontiguous parcels. These include the main battlefield unit, Louisiana Circle, South Fort, Navy Circle, Grant's Canal, and Pemberton's Headquarters. Vicksburg National Cemetery abuts the park and is administered by NPS.

The purpose of Vicksburg NMP (NPS, 1980) is the:

> *"preservation and protection of existing earthworks, fortifications, structures, monuments, memorials, and other outstanding natural and historical features within its jurisdiction in such a way as to provide the visitor with a pleasing and rewarding experience. It is also to further the visitor's understanding and appreciation of the ordeal experienced by all persons of both North and South at Vicksburg during the months of May, June, and July 1863."*

Vicksburg NMP and Vicksburg National Cemetery comprise 1,800 acres. The park includes approximately 1,330 monuments, 16 miles of tour roads, and many earthen fortifications that document the components of the Union and Confederate armies during the siege. NPS faces many challenges associated with the long-term management and maintenance of the park. As part of the planning process intended to support decisions regarding management of the park, NPS is preparing a CLR for Vicksburg NMP. The CLR is intended to provide NPS with an assessment of the character-defining features of the Vicksburg NMP landscape, document historic and existing conditions, and develop specific treatment recommendations to ensure the future protection of the park and its natural and cultural resources (NPS, 2008). The main battlefield unit (Figure 1-2) is the primary focus of the CLR although the three small forts along the Mississippi River – South Fort, Louisiana Circle, and Navy Circle – are also addressed in the report. Landscape treatments are also proposed at South Fort. The EA will analyze the preferred alternative and the other proposed alternatives in the CLR and their impacts on the environment.

Today, the Vicksburg battlefield bears little resemblance to the landscape at the time of the siege. NPS management practices since the establishment of the park have allowed parklands to be naturally reforested. Areas that were once cleared during the siege are now forested as a result of natural vegetative regeneration and plantings by the Civilian Conservation Corps (CCC) in the 1930s to minimize soil erosion. These areas now provide important wildlife habitat in a unique loess soil bluff environment. If landscape treatments described in the EA are not implemented, the existing park will continue to misrepresent historic battlefield landscape conditions and will reduce visitor understanding of the events that the park commemorates (NPS, 2008).

Figure 1-1 Vicksburg National Military Park Site Location Map

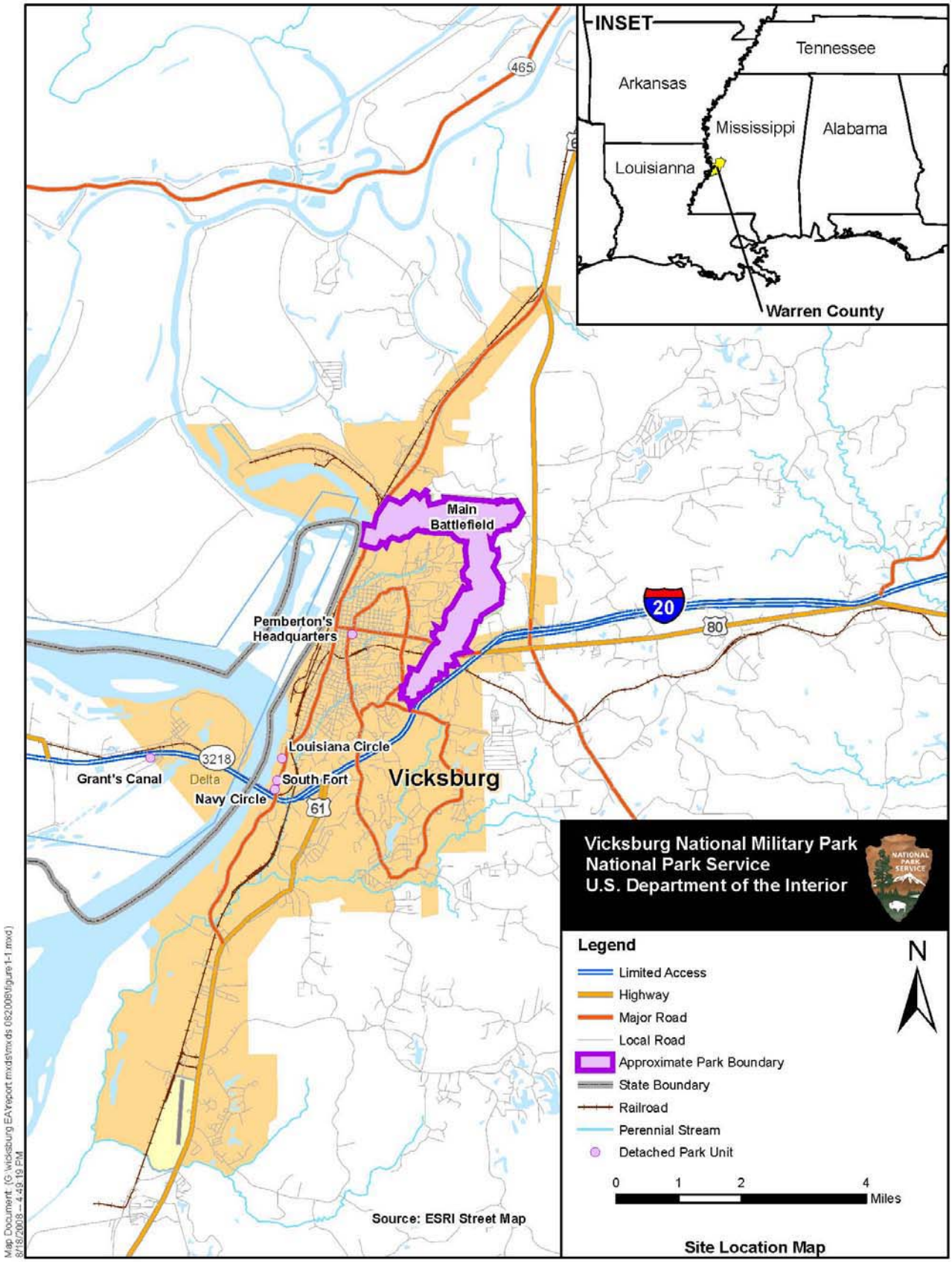


Figure 1-2 Vicksburg National Military Park Main Battlefield Areas

The CLR will also be used in support of an updated parkwide General Management Plan (GMP), a Comprehensive Long-range Interpretive Plan, and associated compliance as required by the National Environmental Policy Act (NEPA) of 1969, as amended. It will also be used to guide any additional landscape treatments beyond the initial landscape treatments discussed in the CLR. The GMP and Comprehensive Long-range Interpretive Plan are essential tools that will help guide future management of the park's resources (NPS, 2008).

EO 11990 ("Protection of Wetlands") requires the National Park Service and other Federal agencies to evaluate the likely impacts of their actions on wetlands. The objectives of the EO are to avoid, to the extent possible, the long-term and short-term adverse impacts associated with the occupancy, modification, or destruction of wetlands. NPS Management Policies (2006) and Director's Order 77-1, "Wetland Protection" (NPS 2002) reiterates the importance of safeguarding wetlands. NPS Procedural Manual #77-1 provides agency-specific procedures for complying with the EO. The purpose of this Statement of Findings is to present the rationale for undertaking a project with potential adverse impacts to wetlands and to document the anticipated effects.

EO 11988 ("Floodplain Management") requires the NPS and other federal agencies to evaluate the likely impacts of actions in floodplains. The objective of EO 11988 is to avoid, to the extent possible, the long and short term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative. NPS Director's Order #77-2 Floodplain Management and Procedural Manual #77-2 provide NPS policies and procedures for complying with EO 11988. The proposed project would have no adverse effect to known floodplain areas. The only Federal Emergency Management Agency (FEMA)-designated floodplains within Vicksburg NMP are in the northwest corner of the park where Mint Spring Bayou enters the Yazoo River Diversion Canal. None of the proposed alternatives would result in any impacts to the designated floodplain in this area. Therefore, guidance under Director's Order 77-2 would not apply to the proposed project.

2. PROPOSED ACTION

The purpose of the CLR is to guide landscape treatment and maintenance so that the park meets its mandate to "commemorate the campaign, siege and defense of Vicksburg, and to preserve the history of the battles and operations of the siege and defense on the ground where they were fought and were carried on. …" The park's authorizing legislation further includes specific actions to meet the overall purpose: "to restore the forts and the lines of fortification, the parallels and approaches of the two armies, or so much thereof as may be necessary to the purposes of the park." The CLR seeks to provide a clear direction to manage the landscape in ways that commemorate the campaign, siege, and defense of Vicksburg, as required by Congress, by preserving resources and enhancing visitor understanding and appreciation of the events that occurred here while providing a variety of experiences and complying with other laws and regulations.

Four alternatives were evaluated as a part of the EA and are outlined below. Under the preferred alternative (Alternative C), the proposed action would reveal the historic landscape of the Civil War siege in the areas that collectively represent physical resources at key military engagement sites. At the time of the battle, the project areas consisted of fields, pasture, and meadows that were modified by military fortifications. During the 1863 siege, the landscape had been cleared of most forested areas. Trees were removed to establish clear fields of fire from Confederate earthworks, to construct additional fortifications and structures by both Union and Confederate forces, and to construct abatis (improvised obstacles) to impede the movement of Union forces.

The openness that characterized this area in 1863 persisted until the early 1900s. However, plantings by the CCC in the 1930s to minimize soil erosion and natural vegetation regrowth have established forested areas in these once open fields. The EA examines alternatives that involve rehabilitation of significant large-scale elements of the park's historic landscape, including the pattern of open fields and wooded areas. Rehabilitation would remove mature trees (60 to 80 feet tall) and replace them with grassed fields. Within riparian corridors, the mature trees would be replaced with a woody buffer consisting of low growing native trees and shrubs species (less than 15 feet tall). Vegetation that is less than 15 feet tall would be allowed to remain in the riparian area. Vegetation would be maintained by trimming to keep vegetation heights within wetlands and riparian areas below 15 feet. Removal of the non-historic vegetation would more accurately portray the historic avenues of approach and fields of fire that were important to the siege of Vicksburg.

ALTERNATIVES CONSIDERED BY THE EA

Four draft alternatives were developed during a November 2007 workshop with the project team. A full range of reasonable alternatives was developed, meeting the park's purpose and objectives for taking action and meeting NPS guidelines for providing different means of accomplishing park goals while protecting and/or minimizing impacts on some or all resources. Furthermore, the draft alternatives are consistent with applicable laws, policies, and regulations that guide NPS. The alternatives under consideration are listed below:

- Alternative A – Continue Existing Management (No Action)
- Alternative B – Preservation Through Best Management Practices (BMPs)
- Alternative C – Rehabilitate/Maintain Key Areas of Military Engagement
- Alternative D – Rehabilitate/Maintain the Broad Spectrum of Military Engagements

Two additional alternatives were considered but dismissed because they were determined to be unreasonable. Alternatives that were considered but dismissed are briefly discussed at the end of this section.

The no action alternative, Alternative A, would maintain the existing interpretive exhibits and landscape condition in the park. The three action alternatives include different ways of making the cultural

landscape and the story of Vicksburg more accessible to park visitors through a variety of interpretive programs, including technology and media exhibits and through clearing of the landscape. Alternative B (preservation through BMPs) focuses on technology and media exhibits as an important means of visitor interpretation, as well as protecting the existing cultural landscape through implementation of BMPs. Alternative C (rehabilitate/maintain areas of key military engagements) and Alternative D (rehabilitate/maintain the broad spectrum of military engagements) focus on clearing of the cultural landscape as a primary means of interpretation. Alternative C involves clearing in three key areas of activity during the siege, totaling approximately 90 acres, while Alternative D involves clearing of a broader area of military activity totaling approximately 350 acres.

These three action alternatives and the no action alternative were evaluated using a process called "Choosing by Advantages" (CBA) during meetings at Vicksburg NMP on June 24-25, 2008. This process evaluated alternatives by identifying and comparing the relative advantages of each according to a set of criteria. The alternatives were rated on how well they met following attributes and factors or had an advantage in meeting each attribute and factor:

- facilitating understanding and interpretation of the park story
- allowing visitors to experience history up close
- protecting physical features and resources from degradation
- providing opportunities for a variety of visitor experiences while maintaining the historic character and integrity of the landscape and managing visitor use conflicts
- protecting physical features from degradation
- developing sustainable ways of maintaining the landscape;
- protecting natural and cultural features relative to their place in achieving the purpose of Vicksburg NMP

Alternative C received the highest score of the four alternatives evaluated, and it is the NPS-preferred alternative. Alternative C provides the widest range of benefits to park visitors, the natural and cultural environments, and park maintenance, with minimal environmental degradation. Alternative A does not meet the purpose and need of the EA. Alternative B provides a variety of visitor use experiences, but it does not expose the cultural landscape of the siege activities so that the visitor can understand the Vicksburg campaign. Alternative D reveals more of the cultural landscape than does Alternative C, but it does so at the expense of park natural resources, including extensive wetland/stream impacts.

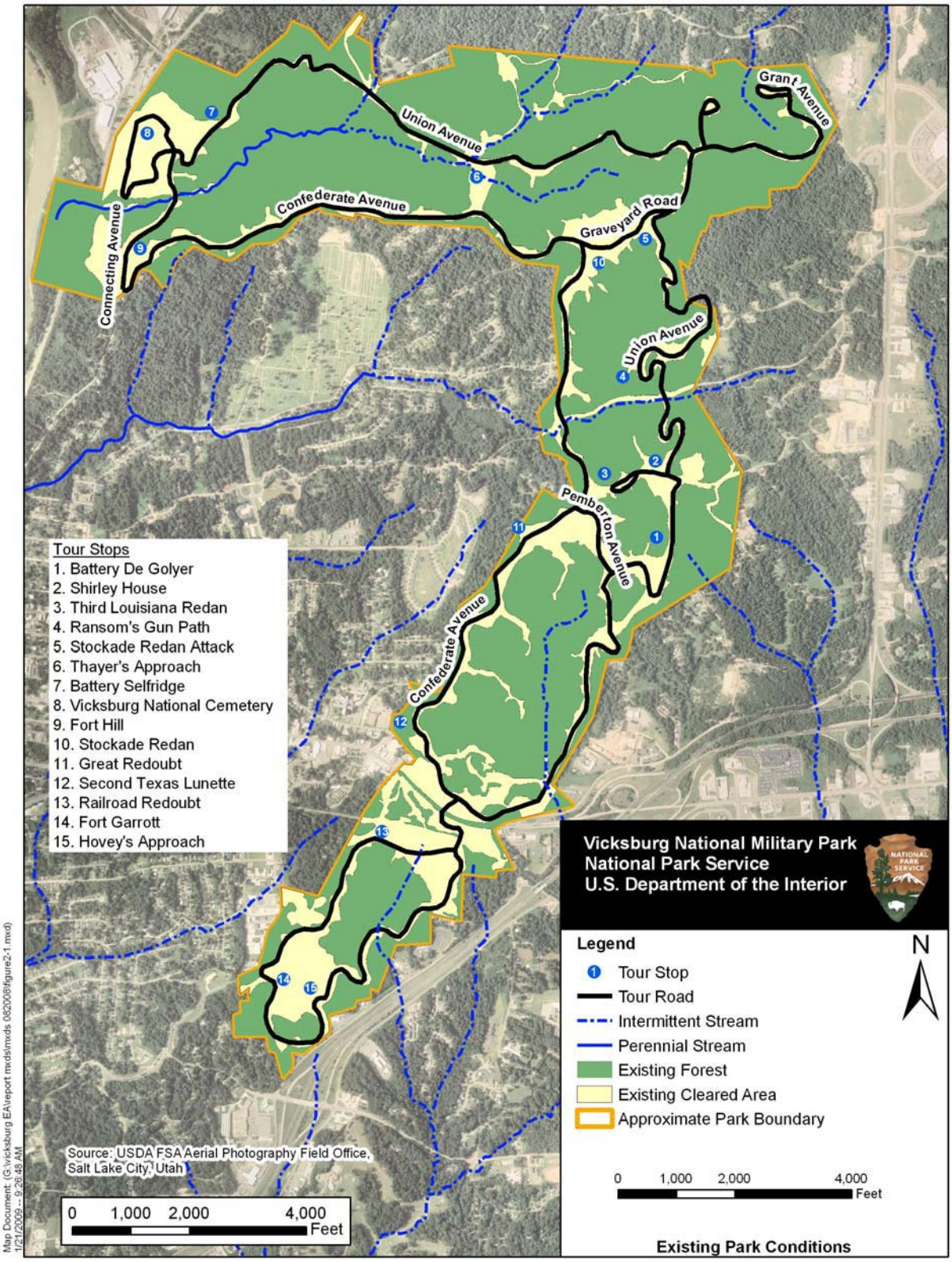
No impacts to wetlands and streams are proposed under Alternatives A and B. Alternative C would result in short-term and long-term adverse impacts to approximately 7 acres of forested wetlands as a result of their conversion from forested wetlands to scrub-shrub and emergent wetlands. Alternative D would result in short-term and long-term adverse impacts to approximately 97 acres of forested wetlands as a result of their conversion from forested wetlands to scrub-shrub and emergent wetlands.

Detailed descriptions of each of the alternatives follow. More detailed descriptions of the individual elements of each alternative and analyses of their proposed effects to the natural and human environments can be found in the EA prepared for the EA.

ALTERNATIVE A – CONTINUE EXISTING MANAGEMENT (NO ACTION)

The no action alternative describes the action of continuing the current management operations and conditions. It does not imply or direct any change to current management or the removal of existing uses, development, or facilities. The no action alternative provides a basis for comparing the management direction and environmental consequences of the action alternatives. Should the no action alternative be selected, NPS would respond to future needs and conditions associated with Vicksburg NMP without major actions or changes in present course. Figure 2-1 presents the existing park conditions, including the currently forested and cleared areas of the park.

Figure 2-1 Existing Park Conditions



ALTERNATIVE B – PRESERVATION THROUGH BMPS

Alternative B would preserve resources by applying BMPs to areas within the park. Interpretation would become the primary means for commemoration and communication of the site history to the visitor. This alternative would involve the development of new exhibits, waysides, signage and other interpretive features at different locations around the park. Also, three 10-acre sites would be converted to a new landcover type intended to best protect against soil erosion based on the recommendations of local ecologists and plant scientists. These sites would be monitored, and the approach adapted based on evaluation of the success of the resulting plant communities. Additional areas of the park would then be converted over time using this adaptive approach. It is anticipated that the alternative would not impact wetlands or riparian areas.

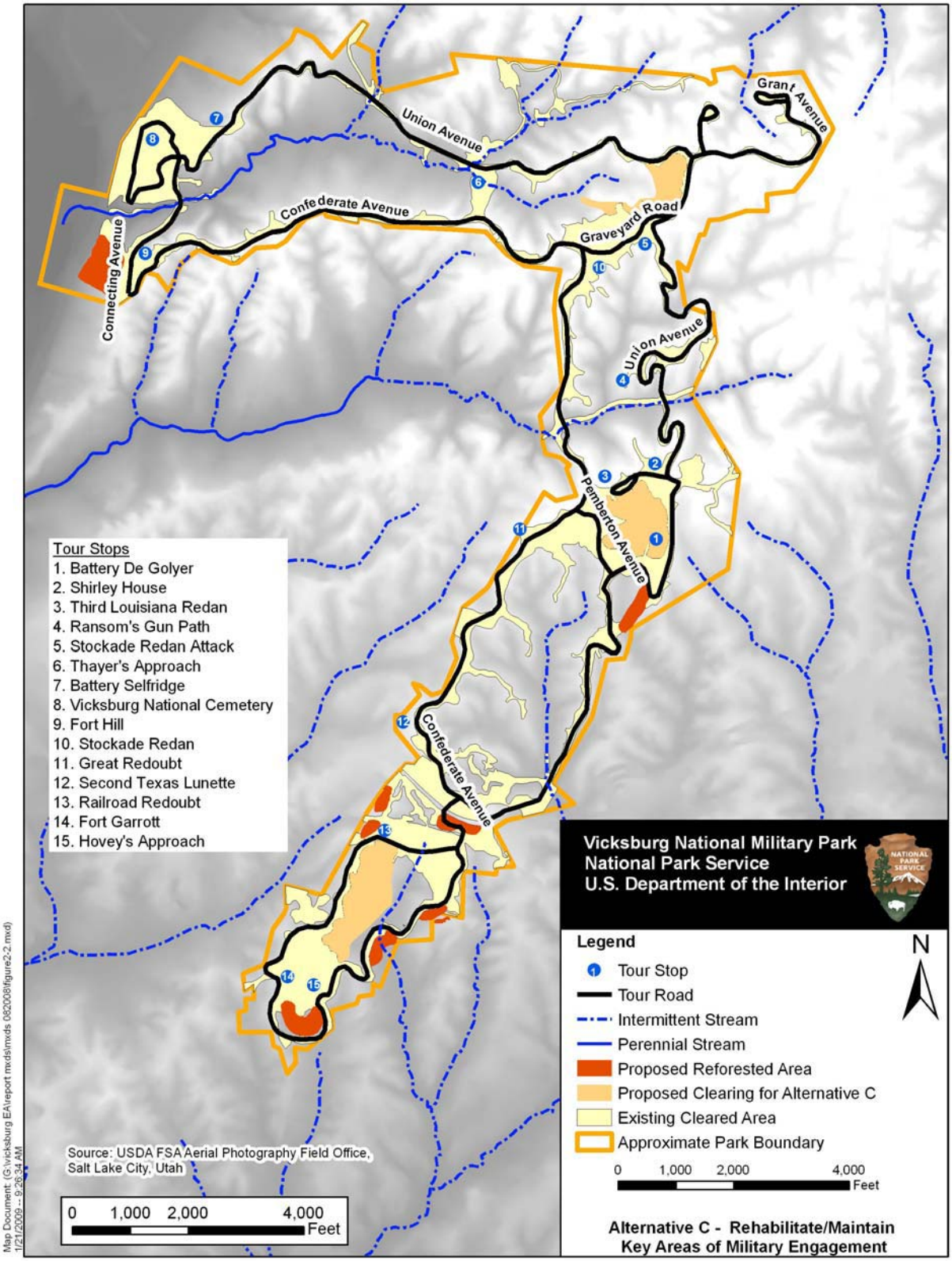
ALTERNATIVE C – REHABILITATE/MAINTAIN KEY AREAS OF MILITARY ENGAGEMENT

Under Alternative C, Vicksburg NMP would rehabilitate the park landscape, primarily by rehabilitating Civil War military resources. Alternative C would implement land cover changes within the park to reveal the historic landscape of the Civil War siege in the areas that collectively represent physical resources at key military engagement sites for meeting the legislative mandate of the park to "commemorate the campaign and siege and defense of Vicksburg," and "restore the forts and the lines of fortifications, the parallels and the approaches of the two armies, or so much thereof as may be necessary to the purposes of the park." Identification of the key areas was based on careful review and understanding of the military terrain that molded the events of September 1862 through July 1863 and its ability to convey the full range of important military events and activities that occurred there. Preservation and stabilization of important natural, cultural, and historic resources are assumed under rehabilitation. Rehabilitation accommodates new uses and can make historic associations more apparent. Furthermore, enhanced interpretive, park operations, and visitor use and experience elements would be included in Alternative C.

As shown in Figure 2-2, the key areas that would be considered priorities for maintaining open vegetative cover or where enhanced views and access are highly desirable to meet the park's mission of telling the story of the siege and attacks are:

- Area 1 – Old Jackson Road/Battery DeGolyer/Third Louisiana Redan. Implementation of this alternative would provide improved sight lines in this area. It would also benefit the cultural landscape by removing the old Administration Building. Removal would be addressed by the park in a future planning process. Clearing in this area would reveal Union earthworks, existing markers, key Union avenues of approach, and battlefield terrain that are currently obscured from view in the forested area between Confederate earthworks to the west and Union earthworks to the east. Union trench lines are contained within the forested area and are currently not visible from the Confederate earthworks and fortifications that they approached during the siege. Clearing in this area would also provide connectivity between existing cleared battlefield areas. No wetlands or streams are located within this proposed clearing area.
- Area 2 – Railroad Redoubt/Fort Garrott. Clearing in this area would reveal Union earthworks, existing markers, and battlefield terrain that are currently obscured from view in the forested area between Railroad Redoubt to the north and Fort Garrott to the south. Confederate earthworks are currently visible adjacent to the western edge of the proposed clearing limits along the South Loop Tour Road. Some Union earthworks are also visible along the tour road to the east of the proposed clearing limits, but several Union trench lines are contained within the forested area and are currently not visible from the Confederate earthworks and fortifications that they approached during the siege. These trench lines, including existing markers installed during the early years of

Figure 2-2 Alternative C – Rehabilitate/Maintain Key Areas of Military Engagement



Vicksburg NMP that document the locations of Brig. Gen. Lawler's 2nd Brigade, 14th Division, and Col. Lindsey's 2nd Brigade, 9th Division under the XIII Army Corps and Major General John A. McClernand, are concealed from view within the forested areas proposed to be cleared. Natural resource challenges include gley soils (soil that has been saturated over a long period of time, therefore reducing the iron and manganese content) and wetland areas.

- Area 3 – Graveyard Road/Stockade Redan. This area is the best place to tell the story of combat; the May 19 to 22, 1863, attacks; the construction methods and components of Stockade Redan; and a key Union avenue of approach. Natural resource challenges include wetlands, heavy forest, and Mint Spring Bayou.

Alternative C would enhance the visual accessibility of these three key areas of the battlefield landscape by removing approximately 90 acres of existing forest cover and replacing it with a low-growing groundcover. The alternative would retain older native trees where they do not block important views, particularly those that afford shade along the tour road.

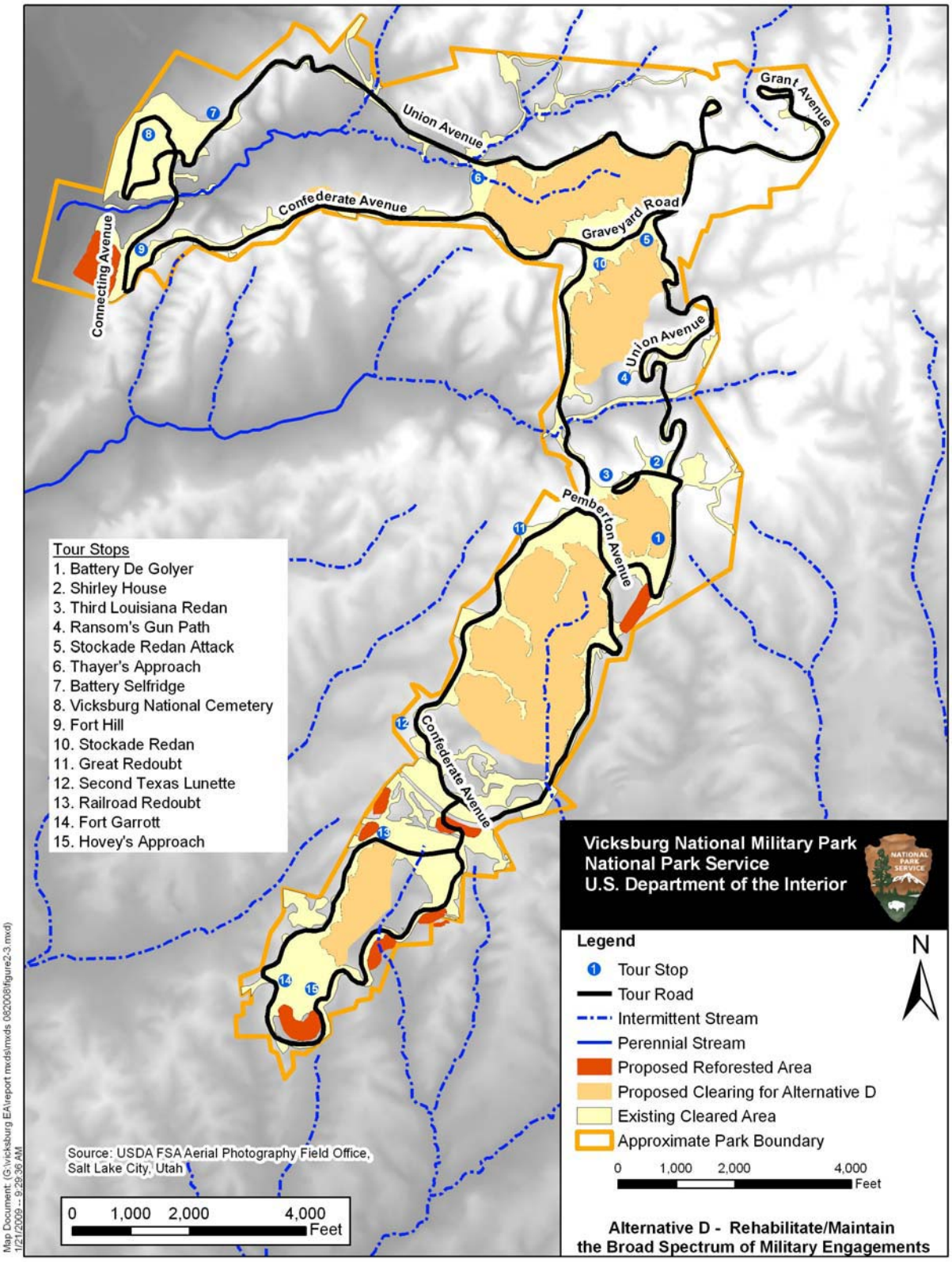
Alternative C would also include the re-establishment of spatial patterns associated with the 1863 battlefield landscape within view of the tour road corridor, such as key visual connections between artillery positions of the opposing armies, fields of fire, and exposure of terrain features that can be tied to the military engineering of the two lines. This approach would prioritize interventions that enhance the experience of the visitor touring the park within a vehicle, as many visitors do. This alternative would incorporate a combination of judicious woodland clearing, thinning, and limbing up of canopy trees to enhance visual accessibility along the auto tour route. Alternative C would also establish new forest cover over 20 acres of the park to enhance screening of incompatible views and help protect the park's setting and critical viewsheds. Reforestation would involve the planting of tree, shrub, and groundcover species representative of a desired future woodland composition.

ALTERNATIVE D – REHABILITATE/MAINTAIN THE BROAD SPECTRUM OF MILITARY ENGAGEMENTS

Under Alternative D, an extensive area of Vicksburg NMP would be rehabilitated by the removal of woodlands to reveal a broad spectrum of sites of military engagement. Alternative D assumes that interpretation and education of visitors should feature authentic connections between physical resources and military events, using military terrain analysis as the basis for revealing the key stories associated with the Vicksburg landscape. Implementation of Alternative D would enhance the legibility of Civil War-era resources and associations through the removal of forest cover that has grown up since the end of the siege and currently obscures many visual and physical relationships that were important to the events that occurred at Vicksburg in 1863. Tree clearing would occur in areas identified through military terrain analysis as key to the battle and siege tactics of Union and Confederate commanders, and to its understanding. Interpretation would be provided to help visitors understand what happened within these modified areas. Later additions to the landscape that support visitor use of the park and NPS administration of the site, as well as late 19th and early 20th century commemoration of the Civil War, would be retained to interpret the park's enabling legislation. Alternative D assumes that the best way to "commemorate the siege and preserve the history of the battles and operations of the siege and defense on the ground where they were fought and were carried on …" is to reveal the landform, topography, and earthen fortifications associated with Union and Confederate lines and the landscape that was modified to offensive and defensive purposes between them.

As shown in Figure 2-3, the key areas that would be considered priorities for maintaining open vegetative cover or where enhanced views and access are highly desirable to meet the park's mission of telling the story of the siege and attacks are:

Figure 2-3 Alternative D – Rehabilitate/Maintain the Broad Spectrum of Military Engagements



- The extent of the Union and Confederate lines and the landscape between them between Thayer's Approach and Fort Garrott, with buffer plantings to be established or remain in association with the visitor center, maintenance area, and Clay Street.
- Clearing to expose a visual connection to the water battery from Fort Hill would be another localized effort that would support implementation of this alternative.
- Fort Hill and the landscape north and west of Thayer's Approach would not be cleared because there was little military activity in this area, and most of the park's forest and natural resources, wetlands, and Mint Spring Bayou exist within this area.
- However, forest would be retained in the area behind the Illinois Monument up to Old Jackson Road to protect the steeply sloped topography that could not otherwise be maintained, and to provide a visual screen for modern Jackson Road.

Alternative D would enhance the visual accessibility of the battlefield landscape by removing existing forest cover over approximately 350 acres, and replacing it with a low ground cover that does not interfere with visitor visual access of the enhanced areas. Bermuda grass, native grasses and forbs, and other groundcovers would be considered for establishment on newly cleared areas. The type of groundcover to be used in each area should be based on a park assessment of its facility in establishment and maintenance.

Alternative D would also establish new forest cover over 20 acres of the park to enhance screening of incompatible views and help protect the park's setting and critical viewsheds. Reforestation would involve the planting of tree, shrub, and groundcover species representative of a desired future woodland composition.

ALTERNATIVES CONSIDERED BUT DISMISSED

Two additional alternatives were considered but dismissed. The two alternatives were Alternative E – Restoration to Civil War Siege Period (circa 1863) and Alternative F – Restoration to Park Development Period (1899 to 1917). Implementation of either of these alternatives would require the re-acquisition of former parkland that has been heavily impacted by adjacent development. Both alternatives would require extensive tree clearing and replanting of ground cover. Extensive resources would be required to maintain the ground cover. Monumentation would be removed, and interpretive resources would be required at an alternative location. Exceptions would also have to be made for the inclusion of features that do not date to the specified restoration period, such as commemorative monuments and the visitor center, which would negate the guiding concept of the alternatives. Because these alternatives would require extensive clearing of existing and former NPS property, as well as the loss of existing interpretive features, they were dismissed as being not reasonable.

3. SITE DESCRIPTION

No impacts to wetlands and streams would occur under Alternatives A and B. The project area for Alternative C (the preferred alternative) encompasses approximately 90 acres and would result in short-term and long-term adverse impacts to approximately 7 acres of forested wetlands as a result of their conversion from forested wetlands to scrub-shrub and emergent wetlands. The project area for Alternative D encompasses approximately 350 acres of clearing and would result in short-term and long-term adverse impacts to approximately 97 acres of forested wetlands as a result of their conversion from forested wetlands to scrub-shrub and emergent wetlands. Figure 3-1 shows the proposed clearing areas for Alternatives C and D.

Within the project area, potential wetland impacts under Alternatives C and D would be to either riverine, upper perennial, unconsolidated bottom streams or palustrine forested wetlands. These areas are located within the Two-Mile Creek, Durden Creek, Glass Bayou, or Mint Spring Bayou watersheds, all of which are tributary to the Mississippi River or the Yazoo River Diversion Canal. These wetland types are common throughout the park and in the surrounding region, and within the park, the wetland communities include areas dominated by Chinese privet (*Ligustrum sinense*).

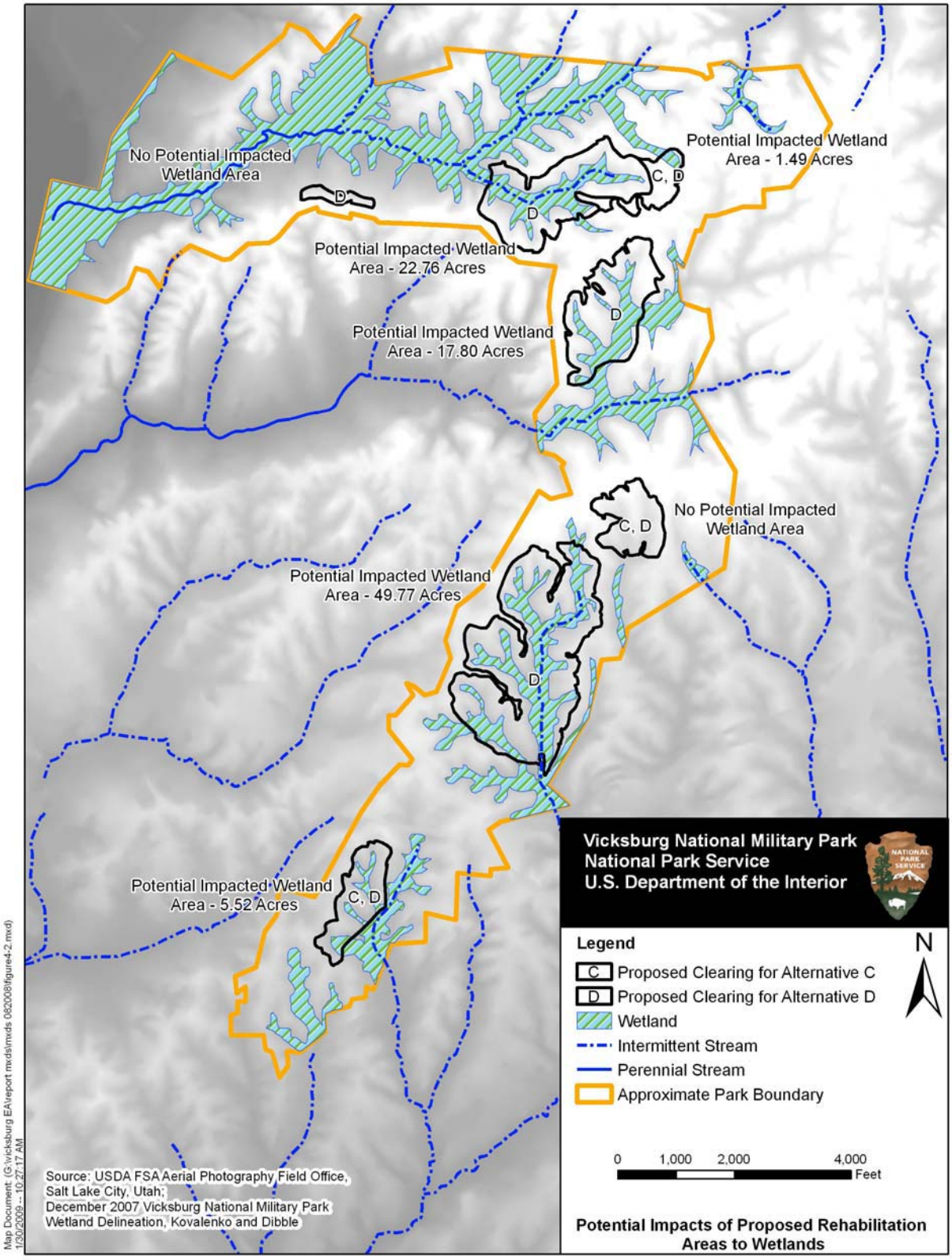
Potential impacts to wetlands from battlefield rehabilitation would involve clearing vegetation from 7.01 acres of forested wetland. Within a 50-foot buffer along streams (25 feet on each side), trees over 15 feet tall would be removed, while trees less than 15 feet tall would remain. This 50-foot streambank buffer would be replanted with native species as necessary to maintain woody vegetation along the streambanks. Vegetation in the buffer would be maintained at a maximum height of 15 feet using commercial pruning and trimming equipment. Outside of the 50-foot streambank buffer, wetland areas would be replanted with low-growing native grasses. Native woody vegetation would be allowed to naturally repopulate this area but maintained to a maximum height of 15 feet.

Information on the wetland systems is derived from a wetland delineation of Vicksburg NMP that was completed in December, 2007 (Kovalenko and Dibble, 2007). The principal investigators for the wetland delineation were Katya Kovalenko, a Ph.D. candidate of Aquatic Ecology in the Department of Wildlife and Fisheries at Mississippi State University, and Dr. Eric Dibble, a professor of Aquatic Ecology at Mississippi State University. This delineation report describes the hydrophytic plant communities, soil types, and hydrology of wetlands and streams in the park and classifies these wetland/stream areas within the Cowardin and hydrogeomorphic systems. The delineation report is included as Appendix A.

Functionally, forested wetlands in the park are defined as seepage or slope wetlands, which are recharged from rainwater that percolates from higher elevations and contributes to seepage, subsurface, and sheet flows. According to disturbance-level criteria, seepage and riverine wetlands in the park were judged pristine to moderately disturbed (primarily by upstream modifications and invasive plants), and modified wetlands were judged severely disturbed (Kovalenko and Dibble, 2007). Forested wetlands of the park may play an important role in control of erosion and siltation. Dense growth of Chinese privet may compromise this role and wetland functions; observations indicated very sparse herb and other shrub cover and lack of extensive root systems in gullies overgrown with privet, whereas nearby areas dominated by native giant cane (*Arundinaria gigantea*) had a more extensive root system in the upper part of the soil (Kovalenko and Dibble, 2007).

Water retention by seepage wetlands is essential for streamflow maintenance and integrity of the overall watershed. Saturated soils were observed in the park up to two months after the last significant precipitation was recorded (Kovalenko and Dibble, 2007). It is also possible that seepage wetlands prevent the soil from extreme desiccation, which may lead to changes in soil structure; therefore, this type of wetland is important for maintaining soil integrity and reducing erosion. (Kovalenko and Dibble, 2007).

Figure 3-1 Potential Impacts of Proposed Rehabilitation Areas to Wetlands



Biological functions of wetlands consist of maintenance of plant and animal communities and regional and landscape biodiversity. A variety of fish, macroinvertebrates, reptiles, and amphibians utilize the wetland and perennial stream habitats that would be cleared. Most of the proposed clearing would occur along intermittent and ephemeral stream channels, which would not maintain year-round populations of these animals. Several obligate wetland plants were observed in Vicksburg NMP during floristic assessment. Park wetlands have a relatively high habitat function. Vicksburg NMP contains one of the few remaining tracts of loess bluff hardwood forests on public land in the United States; therefore, some of the wetlands within the park support plant communities that are regionally rare. None of these areas are proposed to be cleared. No rare, threatened or endangered species are known to occur within the wetland areas. Some areas had lower habitat quality due to the presence of invasive species, especially English ivy and Chinese privet (Kovalenko and Dibble, 2007).

In total, there are four wetland systems evaluated within this document. The wetland areas and their proposed impacts from Alternatives C and D are as follows.

Table 3-1. Potential Impacts to Wetland Areas from Alternatives B, C, and D.

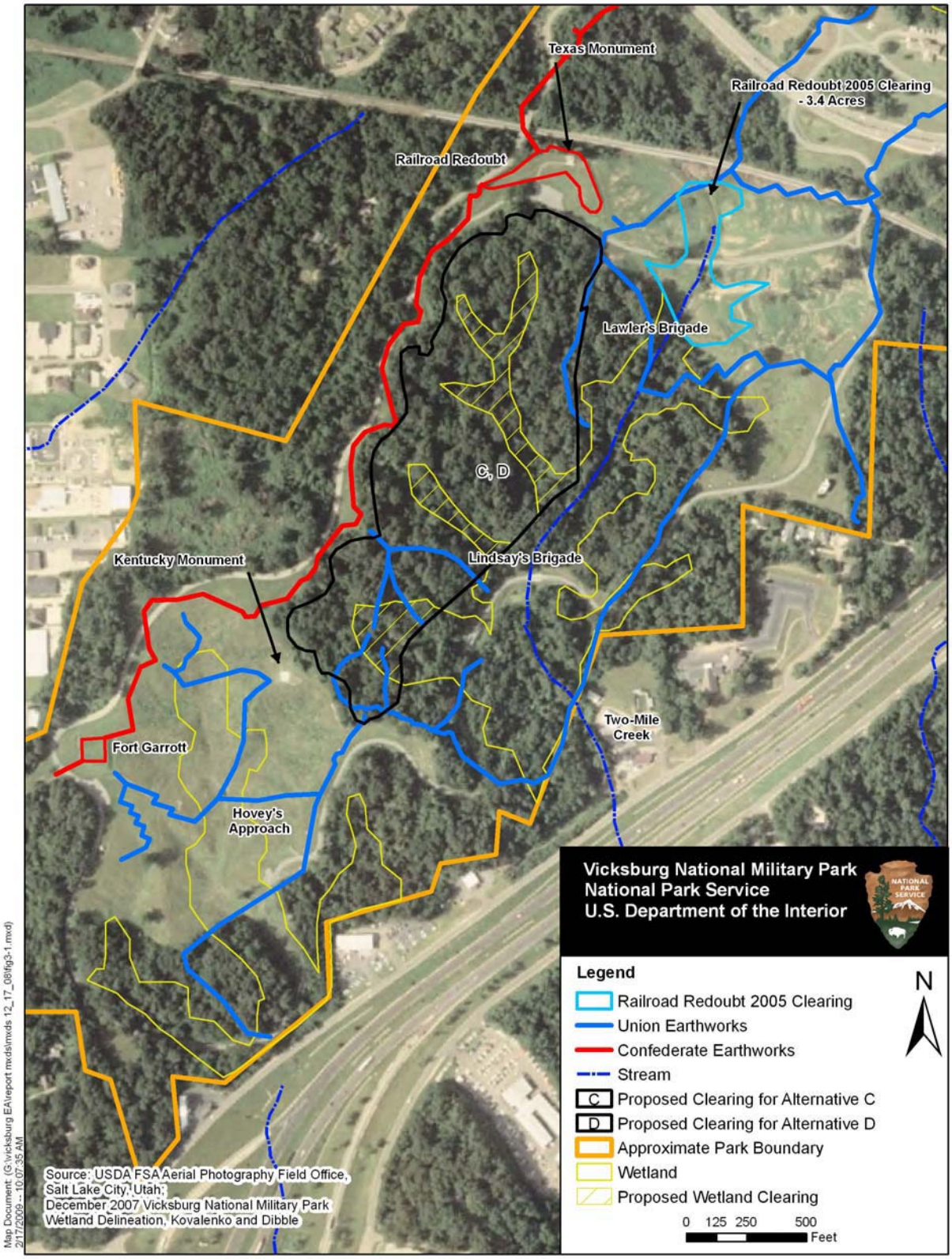
Wetland Area #	Potential Alternative B Wetland Impacts (acres)	Potential Alternative C Wetland Impacts (acres)	Potential Alternative D Wetland Impacts (acres)
(1) Two-Mile Creek Area	none	5.52	5.52
(2) Durden Creek Area	none	none	49.77
(3) Glass Bayou Area	none	none	17.60
(4) Mint Spring Bayou Area	none	1.49	24.25
TOTAL	none	7.01	97.14

TWO-MILE CREEK AREA (1).

Two-Mile Creek and its adjacent tributaries and wetlands are located near the southern boundary of Vicksburg NMP in an area known as the South Loop (Figure 3-2). Approximately 2,400 linear feet of Two-Mile Creek, its unnamed ephemeral and intermittent tributaries, and adjacent wetland areas are located within the proposed clearing limits for Alternatives C and D. Both Alternatives C and D would convert the existing overstory vegetation from approximately 60-80 feet high to approximately 15 feet high. The Cowardin *et al* (1979) classification for Two-Mile Creek is riverine, intermittent, streambed, seasonally flooded. The associated wetlands within the proposed clearing area total 5.52 acres and are classified as palustrine forested, broad-leaved deciduous, and seasonally flooded/saturated (PFO1B/C). Two-Mile Creek originates within park boundaries and flows generally to the south. The watershed sizes of impacts to the Two-Mile Creek tributaries are less than 20 acres each.

Species observed in the wetland during the delineation fieldwork included Chinese privet, Japanese honeysuckle (*Lonicera japonica*), muscadine (*Vitis rotundifolia*), boxelder (*Acer negundo*), sugarberry (*Celtis laevigata*), water oak (*Quercus nigra*), sweetgum (*Liquidambar styraciflu*a), and sand violet (*Viola affinis*) (Kovalenko and Dibble, 2007).

Figure 3-2 Two-Mile Creek Area



Replacement of the wetland forest with a maintained scrub-shrub forest with a maximum canopy height of 15 feet would diminish some functional values in this area. The 50-foot buffer along streams would be cleared of exotic vegetation and vegetation taller than 15 feet, while other vegetation would remain within the 50-foot streambank buffer. Streams would no longer be shaded by mature trees, potentially resulting in elevated water temperatures during and after vegetation removal. A reduction in the amount of organic plant material entering the stream ecosystem may occur with the removal of larger trees. Removal of the larger trees would reduce the opportunity for adding large woody debris to the stream channels, which is an important component of a healthy stream system (Kovalenko and Dibble, 2007).

The conversion of forested wetland to native grasses and scrub-shrub areas may alter the faunal community that uses the area. Wildlife that prefer forested wetlands would relocate to other adjacent areas that remain forested, while species that prefer open or scrub-shrub wetland habitats would utilize the new habitats. The loss of mature trees would eliminate canopy cover, nesting, and food sources used by some wildlife species. During the short-term transition period immediately after tree removal, the reduced canopy cover would likely increase soil and water temperatures, which may be harmful to fish, reptiles, amphibians, and other water dependent wildlife. However, because the streams in this area are ephemeral and intermittent, the impacts to aquatic fauna utilizing this area are expected to be minimal. During the short-term transition period there may be an increased potential for erosion of exposed soils.

As with many of the riparian areas within the park, the wetlands in this area have become dominated by Chinese privet, an invasive species that the park is currently attempting to control. Clearing in this area would allow for the removal of privet and the re-establishment of native wetland and riparian species within the cleared areas. Photos 3-1 and 3-2 document the existing conditions of the Two-Mile Creek tributaries.

Other areas outside of the proposed clearing limits have been cleared recently to expand the viewshed between the Confederate and Union earthworks. To the south, woodlands and wetlands were cleared in 1998 to reveal the military terrain from Fort Garrott and along Hovey's Approach (Photo 3-3).

More recently, the Railroad Redoubt area, north of and adjacent to the proposed clearing area, was rehabilitated in 2005 to highlight an area of intense fighting on May 22, 1863, the only location where Union troops were temporarily able to penetrate the Confederate earthworks (Figure 3-2). Approximately 3.4 acres of wetlands were cleared during this rehabilitation. Prior to clearing, the wetland habitats and functions in this area were the same as those described above for the Two-Mile Creek area. The proposed clearing in the Two-Mile Creek area would further reveal the terrain in this area, allowing park visitors to see from Railroad Redoubt southward along the battlefield to Fort Garrott, similar to the actual conditions present during the siege. These clearings address the project purpose and need by facilitating understanding and interpretation of the park story.

DURDEN CREEK AREA (2).

Durden Creek and its adjacent tributaries and wetlands are located north of the visitor center and maintenance facility, between Union Avenue and Confederate Avenue (Figure 3-3). Over 10,000 linear feet of Durden Creek, its unnamed ephemeral and intermittent tributaries, and adjacent wetland areas are located within the proposed clearing limits for Alternative D. Alternative D would convert the existing overstory vegetation from approximately 60-80 feet high to approximately 15 feet high. No clearing of the Durden Creek area is proposed under Alternative C (the preferred alternative). The Cowardin *et al* (1979) classification for Durden Creek is riverine, perennial, streambed, seasonally flooded. The associated wetlands within the proposed clearing area total 49.77 acres and are classified as palustrine forested, broad-leaved deciduous, and seasonally flooded/saturated (PFO1B/C). Durden Creek originates within park boundaries and flows generally to the south. The watershed size of Durden Creek at the proposed clearing area is approximately 230 acres.

Photograph 3-1 Ephemeral Stream in Two-Mile Creek Area.

Note marker showing location of Illinois 97th Infantry. View looking west.

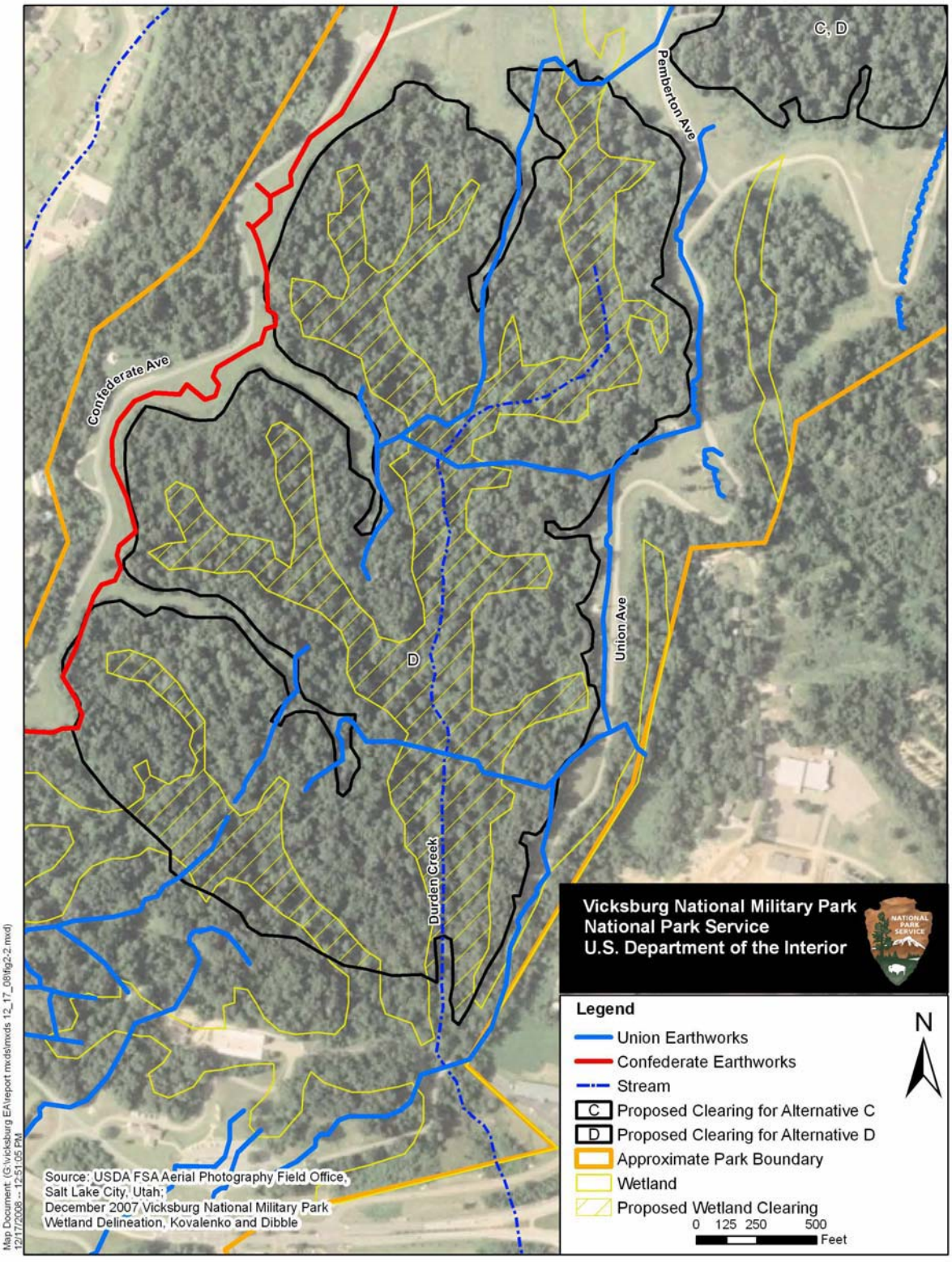
Photograph 3-2 Intermittent Stream in Two-Mile Creek Area.

Note thick privet in stream overbanks. View looking south.

Photograph 3-3 View from Kentucky Monument to Fort Garrott.

Fort Garrott visible in distance to right in photo. Area cleared in 1998. View looking southwest.

Figure 3-3 Durden Creek Area



Species observed in the wetland during the delineation fieldwork included Chinese privet, sycamore (*Platanus occidentalis*), boxelder, sweetgum, sugarberry, tulip tree (*Liriodendron tulipifera*), willow oak (*Quercus phellos*), flowering dogwood (*Cornus florida*), slippery elm (*Ulmus rubra*), giant cane, muscadine, Christmas fern (*Polystichum acrostichoides*), poison ivy (*Toxicodendron radicans*), violet (*Viola floridiana*), and sand violet (Kovalenko and Dibble, 2007).

Under Alternative C (the preferred alternative), this area would not be impacted. Under Alternative D, impacts to wetland and stream functions are consistent with those previously described for Two-Mile Creek. This area also contains Durden Creek, a perennial stream, which would maintain year-round populations of aquatic fauna. Impacts to the aquatic fauna in Durden Creek would be minimized by maintaining a 50-foot buffer along the creek with vegetation less than 15 foot tall.

The wetlands in this area have become dominated by privet. Clearing in this area would allow for the removal of privet and the re-establishment of native wetland and riparian species within the cleared areas. Removal of exotic plants allows for the regrowth of native vegetation, which benefits fauna using the wooded areas. Photos 3-4 and 3-5 document the existing conditions of Durden Creek and its tributaries.

Other areas outside of the proposed clearing limits are already cleared to show the viewshed between the Confederate and Union earthworks. To the north side of the proposed clearing, the Great Redoubt and Pemberton Avenue battlefields are maintained as clearings, and the larger scale of the battlefield terrain would be revealed by connecting this proposed clearing with the existing battlefield. Also, this clearing would connect with an additional proposed clearing area to the northeast that would not impact wetlands or streams.

GLASS BAYOU AREA (3).

Glass Bayou and its adjacent tributaries and wetlands are located just south of Graveyard Road, between Union Avenue and Confederate Avenue (Figure 3-4). Glass Bayou and its adjacent wetlands would not be directly impacted, but over 5,000 linear feet of unnamed ephemeral and intermittent tributaries to Glass Bayou and their adjacent wetland areas are located within the proposed clearing limits for Alternative D. Alternative D would convert the existing overstory vegetation from approximately 60-80 feet high to approximately 15 feet high. No clearing of the Glass Bayou area is proposed under Alternative C (the preferred alternative). The Cowardin *et al* (1979) classification for Glass Bayou is riverine, perennial, streambed, seasonally flooded. The associated wetlands within the proposed clearing area total 17.8 acres and are classified as palustrine forested, broad-leaved deciduous, and seasonally flooded/saturated (PFO1B/C). Glass Bayou originates to the east of Vicksburg NMP, outside of park boundaries, and flows generally to the west. The watershed size of Glass Bayou at the proposed clearing area is approximately 300 acres.

Species observed in the wetland during the delineation fieldwork included Chinese privet, boxelder, giant cane, sweetgum, American hornbeam (*Carpinus caroliniana*), Chinaberrytree (*Melia azedarach*), sycamore (*Platanus occidentalis*), tulip tree (*Liriodendron tulipifera*), eastern cottonwood (*Populus deltoides*), poison ivy, muscadine, and Virginia creeper (*Parthenocissus quinquefolia*) (Kovalenko and Dibble, 2007).

Under Alternative C (the preferred alternative), this area would not be impacted. Under Alternative D, impacts to wetland and stream functions are consistent with those previously described for Two-Mile Creek. This area also contains Glass Bayou, a perennial stream, which would maintain year-round populations of aquatic fauna. Impacts to the aquatic fauna in Glass Bayou would be minimized by maintaining a 50-foot buffer along the creek with vegetation less than 15 foot tall.

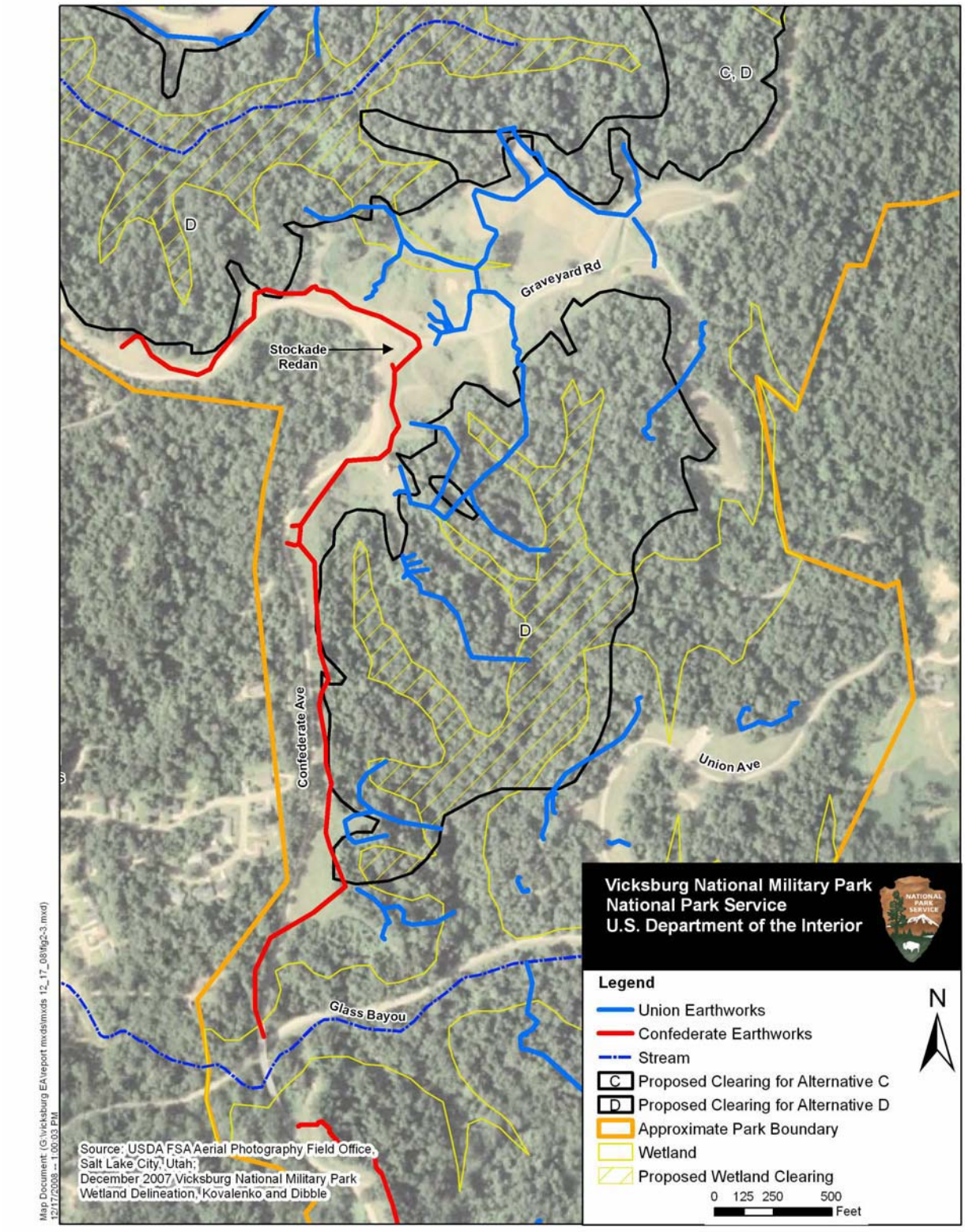
Photograph 3-4 View of Durden Creek from Union Avenue.

Looking downstream from Union Avenue bridge. Note thick privet in stream overbanks. View looking south.

Photograph 3-5 View of Durden Creek Tributary.

View looking east.

Figure 3-4 Glass Bayou Area



The wetlands in this area have become dominated by privet. Clearing in this area would allow for the removal of privet and the re-establishment of native wetland and riparian species within the cleared areas. Photos 3-6 and 3-7 document the existing conditions of the Glass Bayou tributaries.

Other areas outside of the proposed clearing limits are already cleared to show the viewshed between the Confederate and Union earthworks. To the north side of the proposed clearing, the Stockade Redan and Graveyard Road battlefields are maintained as clearings, and the larger scale of the battlefield terrain would be revealed by connecting this proposed clearing with the existing battlefield.

MINT SPRING BAYOU AREA (4).

Mint Spring Bayou and its adjacent tributaries and wetlands are located near the northern boundary of Vicksburg NMP (Figure 3-5). Mint Spring Bayou and its adjacent wetlands would not be directly impacted, but approximately 400 linear feet (under Alternative C) and over 5,000 linear feet (under Alternative D) of unnamed ephemeral and intermittent tributaries to Mint Spring Bayou and their adjacent wetland areas are located within the proposed clearing limits. Both Alternatives C and D would convert the existing overstory vegetation from approximately 60-80 feet high to approximately 15 feet high. The Cowardin *et al* (1979) classification for Mint Spring Bayou is riverine, perennial, streambed, seasonally flooded. The associated wetlands within the proposed clearing area of Alternative C (the preferred alternative) total 1.49 acres and within the proposed clearing area of Alternative D total 24.25 acres. These wetlands are classified as palustrine forested, broad-leaved deciduous, and seasonally flooded/saturated (PFO1B/C). Mint Spring Bayou originates to the east of Vicksburg NMP, outside of park boundaries, and flows generally to the west to its confluence with the Yazoo River Diversion Canal. The unnamed Mint Spring Bayou tributaries within the proposed cleared areas originate within park boundaries and flow generally to the west. The watershed size of the Mint Spring Bayou tributaries at the proposed clearing area is approximately 6 acres for Alternative C (the preferred alternative) and approximately 100 acres for Alternative D.

Species observed in the wetland during the delineation fieldwork included Chinese privet, tulip tree, boxelder, southern magnolia (*Magnolia grandiflora*), willow oak, muscadine, sweetgum, water oak, sycamore, bitternut hickory (*Carya cordiformis*), American hornbeam, slippery elm, and giant cane (Kovalenko and Dibble, 2007).

Impacts to wetland and stream functions are consistent with those previously described for Two-Mile Creek. This area also contains Mint Spring Bayou, a perennial stream, which would maintain year-round populations of aquatic fauna. Alternative C (the preferred alternative) would only impact intermittent and ephemeral tributaries to Mint Spring Bayou but would not impact the perennial portions of the larger stream. Impacts to the aquatic fauna in Mint Spring Bayou from Alternative D would be minimized by maintaining a 50-foot buffer along the creek with vegetation less than 15 feet tall.

The wetlands in this area have become dominated by privet. Clearing in this area would allow for the removal of privet and the re-establishment of native wetland and riparian species within the cleared areas. Photo 3-8 documents the existing condition of the Mint Spring Bayou tributaries.

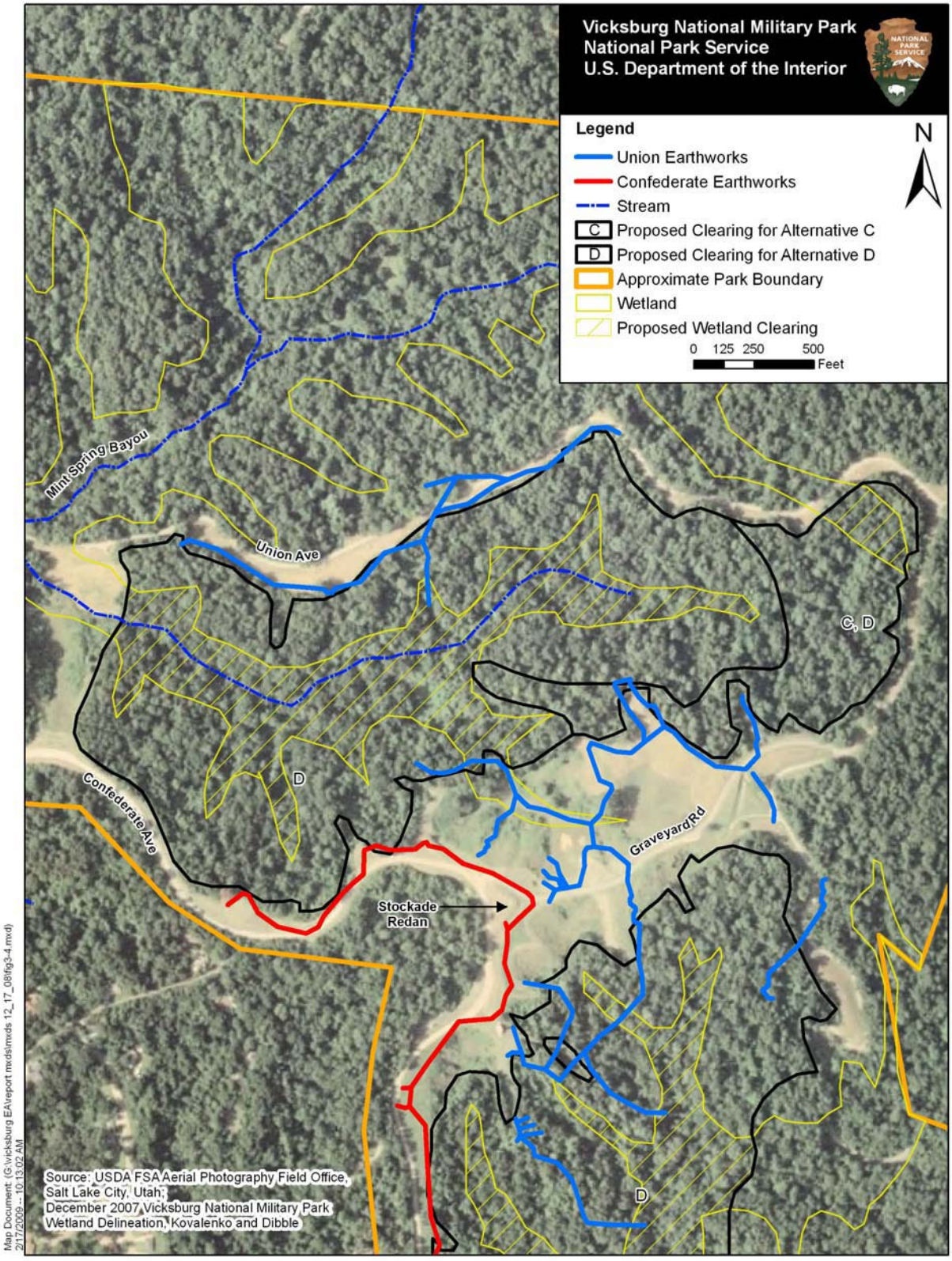
Photograph 3-6 View of Glass Bayou Tributary.

Note thick privet in stream overbanks. View looking south.

Photograph 3-7 View of Cleared Swale in Glass Bayou Area.

Confederate earthworks visible to right in photo, along Confederate Avenue. Proposed clearing would remove additional vegetation within this swale. View looking south.

Figure 3-5 Mint Spring Bayou Area



Photograph 3-8 View of Unnamed Mint Spring Bayou Tributary.

Note thick privet along stream banks. View looking east from Thayer's Approach.

Other areas outside of the proposed clearing limits are already cleared to show the viewshed between the Confederate and Union earthworks. To the south side of the proposed clearing, the Stockade Redan and Graveyard Road battlefields are maintained as clearings, and to the west, Thayer's Approach is maintained as a clearing showing the steepness of the Union approach to the Confederate earthworks. The larger scale of the battlefield terrain would be revealed by connecting this proposed clearing with the existing battlefield. The proposed clearing in the Mint Spring Bayou area would further reveal the terrain in this area, allowing park visitors to see across the battlefield to the location of the opposing army, more accurately representing the conditions present during the siege.

4. MITIGATIVE MEASURES

During the "Choosing by Advantages" process, Alternative C was selected as the preferred alternative because it meets the purpose and need of the EA while minimizing impacts to the natural and cultural environment, including wetlands. Alternative C would impact significantly less wetland area than Alternative D (7 acres versus 97 acres). Based on the selection of Alternative C as the preferred alternative, Vicksburg NMP would propose the following mitigation for impacts that would result from the implementation of Alternative C. These mitigation areas are shown on Figure 4-1.

The National Park Service finds that there are no practicable alternatives to altering approximately 7.01 acres of wetlands within the project area under Alternative C and that still meet park goals outlined in the EA. If the proposed areas are not cleared, Vicksburg NMP will continue to misrepresent historic battlefield landscape conditions and will reduce visitor understanding of the events that the park commemorates. Because portions of the historic battlefield contain wetlands and streams, the rehabilitation activities must accordingly be conducted within the wetland areas.

Potential impacts to wetlands from battlefield rehabilitation would involve clearing vegetation from 7.01 acres of forested wetland. Within a 50-foot buffer along streams (25 feet on each side), trees over 15 feet tall would be removed, while trees less than 15 feet tall would remain. This 50-foot streambank buffer would be replanted with native species as necessary to maintain woody vegetation along the streambanks. Native species to be replanted may include boxelder, red maple, American hornbeam, elderberry (*Sambucus canadensis*), water oak, southern magnolia, tulip tree, black willow (*Salix nigra*), sugarberry, sycamore, sweetgum and cherrybark oak (*Quercus pagoda*). Vegetation in this area would be maintained at a maximum height of 15 feet using commercial pruning and trimming equipment. Outside of the 50-foot streambank buffer, wetland areas would be replanted with low-growing native grasses. Native woody vegetation would be allowed to naturally repopulate this area but maintained to a maximum height of 15 feet.

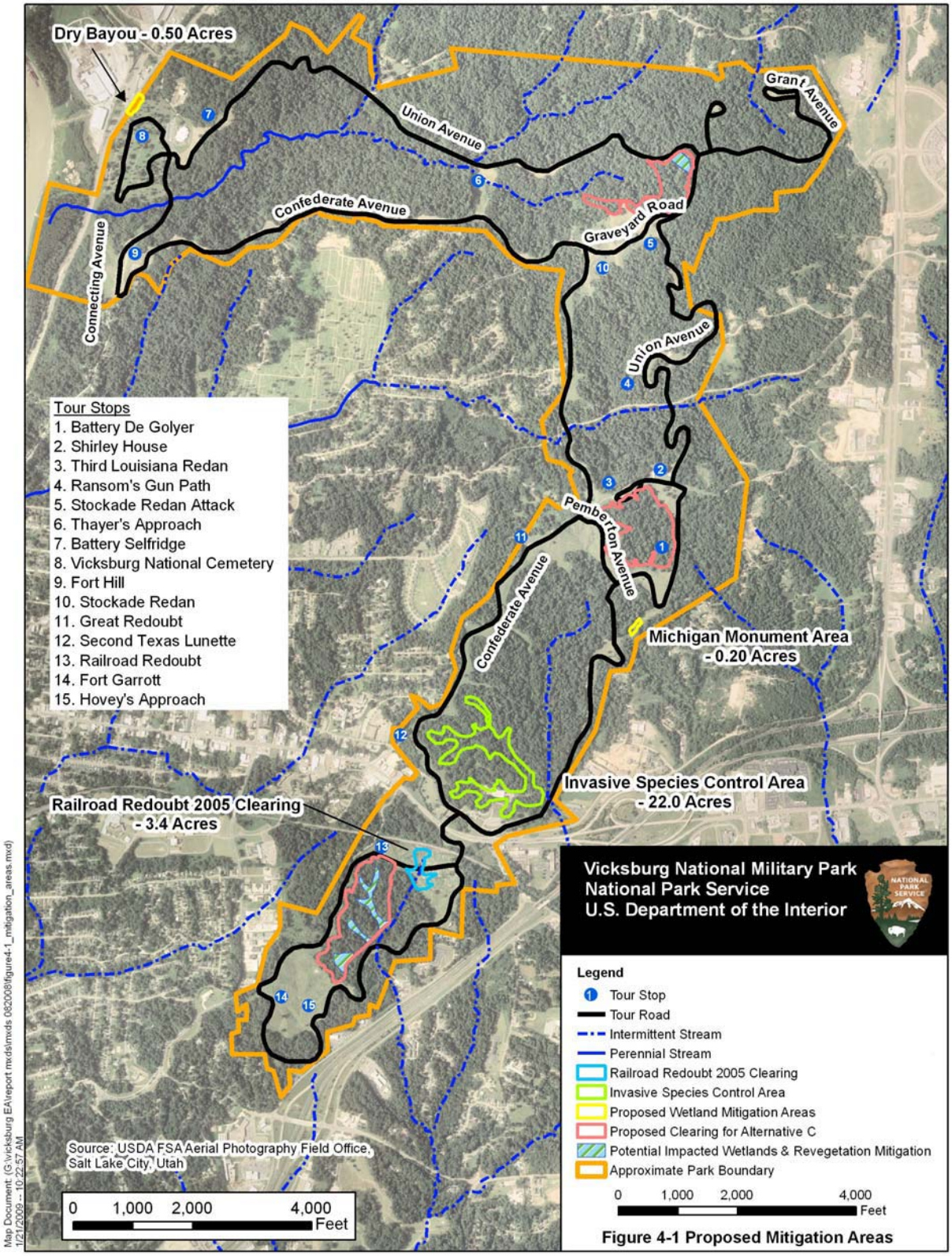
Additionally, Vicksburg NMP would mitigate for 3.4 acres of wetland areas that were impacted in 2005 during battlefield rehabilitation at Railroad Redoubt. The wetlands in this area were cleared during rehabilitation activities and are being allowed to naturally revegetate with native plants that occurred in the wetland prior to the clearing (species include black willow and boxelder). Thus, the proposed mitigation measures would account for the 7.01 acres of potential wetland impacts from Alternative C (the preferred alternative) and 3.4 acres from previous wetland impacts, for a total of 10.41 acres.

Proposed mitigation measure for impacts from the preferred alternative (Alternative C):

- After clearing, 7.01 acres of stream corridor and palustrine wetland in the Two-Mile Creek (Figure 3-2) and Mint Spring Bayou (Figure 3-5) areas outside of the 50-foot streambank buffer would be replanted to native grasses. Woody vegetation would be allowed to naturally regenerate in this area but maintained at a maximum height of 15 feet using commercial pruning and trimming equipment. Privet and other exotic species control in these areas would be conducted to avoid re-introduction of invasive species.

- A 50 foot buffer (25 feet per side) of native scrub/shrub vegetation would be maintained at 15-foot height or less along impacted stream corridors. Within the 50-foot streambank buffer, trees over 15 feet tall would be removed, while trees less than 15 feet tall would remain. The 50-foot streambank buffer would be replanted with native species as necessary to maintain woody vegetation along the streambanks. Vegetation in this area would be maintained at a maximum height of 15 feet using commercial pruning and trimming equipment. Native species to be replanted are listed above.

Figure 4-1 Proposed Mitigation Areas



- 0.20 acres of wetland currently maintained in herbaceous vegetation along Union Avenue downslope from the Michigan Monument would be replanted with native plant species (Photo 4-1). This area, cleared over 30 years ago and currently maintained as a grassed field, would be allowed to return to a forested wetland. Species to be replanted are listed above.

- Approximately 0.50 acres of a 1.16-acre parcel containing "Dry Bayou," a natural spring that has been disturbed by development, would be restored by removing debris, removing non-native vegetation, and replanting with native wetland plant species listed above. The spring is adjacent to the Vicksburg National Cemetery and was disturbed during construction of commercial facilities on the parcel. Vicksburg NMP acquired the "Dry Bayou" property in 2003.

- The park would conduct an exotic plant eradication on approximately 22.0 acres of forested wetlands in the Durden Creek watershed as shown on Figure 4-1. Privet and other invasive exotics would be removed from this area.

The total mitigation acreage proposed for potential impacts from Alternative C (the preferred alternative) is 29.71 acres. The proposed mitigation includes revegetation within the 7.01 acres to be cleared under Alternative C, and an additional 22.70 acres of wetland restoration and exotic species control in other wetland areas within the park. The mitigation measures are summarized below in Table 4-1.

Table 4-1. Preferred Alternative Proposed Mitigation Measures

Proposed Mitigation	Mitigation size (acres)
Planting of native grasses and privet control in cleared wetland areas	7.01 (includes stream buffer replanting)
50-foot stream buffer replanting area and privet control	Acreage included above
Restoration of Michigan Monument wetland area	0.20
Restoration of Dry Bayou wetland area	0.50
Exotic species control along unnamed Durden Creek tributary	22.0
TOTAL	29.71

Best management practices for vegetation removal in wetland areas would be followed. Vegetation removal in wetlands would be done by hand and motorized vehicle access into wetlands would be done on protective mats when necessary to avoid disturbing surface soils. Trees would be felled away from streams and wetlands. Where possible, stumps would be left in place within wetland areas and the cut stumps would be treated with an herbicide safe for use in riparian and wetland areas. Activities would be timed to minimize any impacts on wildlife species and wetlands (generally occurring during dry periods).

Stream crossings would be avoided when possible. However, in the event of any stream crossing metal plates or other suitable bridging material would span the width of the stream, from bank to bank, and all equipment and debris would be transported across the metal plates. This would reduce the potential for incidental sediment eroding into the streams.

Photograph 4-1 Cleared Wetland Downslope from Michigan Monument

Cleared area to be restored to native forest vegetation.

The currently anticipated schedule to implement the preferred alternative and proposed mitigation is to start the battlefield rehabilitation in approximately five years (2014). The clearing activity would be done in three phases, with each phase taking approximately one year to complete. The project would be completed within approximately three years (2017), contingent on available funding.

The wetlands mitigation would begin at the same time as the initiation of the battlefield clearing activities and would progress concurrently with the clearing. Based on the park's experience in other clearing activities within Vicksburg NMP, the cleared and converted wetlands would require approximately four years to become fully functional as scrub/shrub wetlands.

A detailed monitoring and contingency plan would be developed to ensure that erosion and sedimentation control and proposed wetland mitigation are successful and in compliance with Director's Order 77-1. At a minimum, the monitoring plan would be conducted for five years after vegetation removal and would collect information on vegetation development and abundance, species composition, survivorship, and natural recruitment. Information regarding species composition, abundance, and plant survival would document the success of the mitigation efforts, to include areal cover of desirable vegetation and survival of desirable species (planted and natural recruits) in the mitigation areas. Monitoring and maintenance of the wetland mitigation areas would begin once the wetland areas have been cleared and would be implemented as an ongoing park maintenance activity. Maintenance of the converted wetlands would consist of maintaining vegetation at the specified height, with periodic removal of vegetation exceeding specified height limits. Maintenance of the re-vegetated areas would consist of ongoing monitoring for and correction of erosion. Monitoring would document the success of the revegetation and replanting effort. If the monitoring program indicates that replanting or revegetation efforts have not been successful, then a contingency plan would be instituted to address replanting and/or revegetation of cleared areas, as necessary.

Funding sources for the preferred alternative, including the proposed mitigation activities, would be obtained from multiple sources. Funding sources could include Repair/Rehabilitation (if funded in phases); Cultural Resource Preservation Program; Line Item Construction (if funded all at the same time); and donations.

5. COMPLIANCE

CLEAN WATER ACT SECTION 404

The proposed actions have the potential for incidental impacts to waters of the United States as defined by the Clean Water Act and are therefore subject to review by the U.S. Army Corps of Engineers (USACE). The Clean Water Act Section 404 regulates the discharge of dredged or fill material into the waters of the United States. The preferred alternative does not require fill or dredging of any stream or wetland. Since this action would not result in fill material being placed in streams or wetlands and the proposed activity within the wetlands would not involve mechanized clearing, the preferred alternative would not require a USACE 404 Permit under the Clean Water Act. Coordination with USACE would occur during the EA review process.

Erosion and Sedimentation Control Plans would be completed to determine suitable landings or areas on the ground where trees would be temporarily stored while awaiting removal from the site. Suitable landings would be determined by soil type and natural hydrology of the project area. Stream crossings are not recommended. However in the event of a stream crossing metal/steel plates would be used to minimize the potential impacts to streams.

NATIONAL ENVIRONMENTAL POLICY ACT

This Statement of Findings for Executive Order 11990 will be included as a part of the EA for the proposed project. The EA will document compliance with the requirements of the National Environmental Policy Act for this project, as required under Director's Order 12, "Conservation Planning, Environmental Impact Analysis, and Decision-making."

6. CONCLUSION

Under the preferred alternative (Alternative C), there would be no net loss of wetlands; however, the overstory canopy within wetlands along streams would be reduced from 60-80 feet tall to 15 feet tall or less. Although the wetlands are not being filled and the wetland hydrology is not being altered, replacement of the wetland forest with a scrub-shrub canopy would diminish some functional values. Removal of the trees would reduce the opportunity for adding large woody debris to the stream channels, which is an important component of a healthy stream system. The loss of trees would eliminate canopy cover, nesting, and food sources used by some wildlife species. During the short-term transition period immediately after tree removal, the reduced canopy cover would likely increase soil and water temperatures, which may be harmful to fish, reptiles, amphibians, and other water dependent wildlife. During the short-term transition period there may be an increased potential for erosion of exposed soils.

The National Park Service finds that there are no practicable alternatives to altering approximately 7.01 acres of wetlands within the project area under Alternative C and that still meet park goals outlined in the EA. Potential impacts to wetlands from battlefield rehabilitation would involve clearing vegetation from 7.01 acres of forested wetland. Within a 50-foot buffer along streams (25 feet on each side), trees over 15 feet tall would be removed, while trees less than 15 feet tall would remain. This 50-foot streambank buffer would be replanted with native species as necessary to maintain woody vegetation along the streambanks. Vegetation in this area would be maintained at a maximum height of 15 feet using commercial pruning and trimming equipment. Outside of the 50-foot streambank buffer, wetland areas would be replanted with low-growing native grasses. Native woody vegetation would be allowed to naturally repopulate this area but maintained to a maximum height of 15 feet. Compensatory mitigation for proposed impacts from the preferred alternative (Alternative C) is described in Section 4.

Care was taken to select an alternative that would minimize the impacts on natural resources, including wetlands, while still meeting project objectives. Wetland impacts would be avoided to the maximum practicable extent, and the wetland impacts that cannot be avoided would be minimized. Compensatory mitigation ratio for this project (for improvement over loss, i.e., the trade of functional loss for functional improvement from wetland restoration and exotic vegetation removal) is greater than a 1:1 ratio. This project is consistent with the NPS no net loss of wetlands policy. The National Park Service, therefore, finds that this project is in compliance with Executive Order 11990: “Protection of Wetlands.”

7. REFERENCES

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APPENDIX A

VICKSBURG NATIONAL MILITARY PARK WETLAND DELINEATION

Vicksburg National Military Park

Wetland Delineation

Katya Kovalenko and Eric Dibble

Department of Wildlife and Fisheries
Mississippi State University

Final Report

December 2007

Executive Summary

This study was conducted to investigate potential wetlands in Vicksburg National Military Park. On-site determination was done according to the 1987 U.S. Corps of Engineers Manual and the decision about the status of each area was made following the U.S. Fish and Wildlife Service guidelines. This report describes the most common hydrophytic plant communities and discusses soil and hydrology indicators observed in the area. Wetlands were classified according to the National Wetlands Inventory as well as Hydrogeomorphic classification systems. Park wetlands were found to be either riverine, both unconsolidated bottom or streambed, or palustine forested wetlands. Wetlands in the park are most commonly associated with slopes with seepage-saturated soils, gullies, ephemeral creek beds, and streams. Attached map shows wetland boundaries to the best resolution of available digital elevation models. Qualitative assessments and analysis of available literature indicate that VNMP wetlands have several relatively high biological and hydrological functions.

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Introduction and definitions

Wetland is a generic term used to describe a variety of habitats including, but not limited to, marshes, swamps, bogs, and bottomland hardwood forests. According to the U.S. Fish and Wildlife Service, wetlands are "lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is covered by shallow water. For purposes of this classification, wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is non-soil and is saturated with water or covered by shallow water at some time during the growing season of each year" (Cowardin *et al.* 1979). Alternatively, according to the 1987 U.S. Corps of Engineers Manual (thereafter, the 1987 manual), all three criteria (hydrology, soils and vegetation) must be met for an area to be designated a wetland. National Park Service adopts the U.S. Fish and Wildlife Service wetland classification system.

Vicksburg National Military Park (VNMP) commemorates the siege and defense of Vicksburg and, in addition to important cultural resources, the park also has a rich variety of natural habitats. This goal of this project was to investigate potential wetlands in Vicksburg National Military Park and their possible functions.

Methods

Existing maps

Off-site wetland determination often relies on Soil Survey, NWI, USGS or aerial photography. All available maps and an infrared aerial photo were reviewed for preliminary assessment of wetlands. Soil Survey maps for Warren County were used for preliminary

assessment of soils. Since forested wetlands are difficult to interpret based on aerial photography and none of the maps reviewed provided sufficient detail for off-site determination, an on-site routine method for large area (Environmental Laboratory 1987) was used for delineating VNMP wetlands.

Transect choice

Transects were chosen to intersect the main features of the terrain for example, perpendicular to a stream or across a gully. When topography allowed, intervals between transects were less then or equal to 0.5 mile. In certain cases, more transects were done to account for highly heterogeneous terrain. Yet in other cases sampling was impossible due to steep slopes. Overall boundary determination was done by extrapolating sampling points by the elevational gradients. According to the 1987 Manual, a representative sampling point was selected within each distinct plant community in a transect.

All sampling points were mapped using a Garmin ® GPSmap 76, except for several areas that had no satellite reception due to dense vegetation and narrow gullies; these were mapped based on landmarks such as distance from stream. Transects were done in accordance with the 1987 manual but each datasheet also contains information on whether the site is a wetland according to Fish and Wildlife Service National Wetland Inventory criteria (Cowardin *et al.* 1979), as mandated by the Procedural Manual 77-1 (National Park Service). Field work was conducted in February (preliminary), March, April, July, October, and November 2007. No sampling was done in July because of high precipitation which had a potential to bias hydrology criteria.

Vegetation

Woody vegetation, shrubs, and vines are usually sampled in 10-m radius plots (Environmental Laboratory 1987); however, due to a very complex landscape in the park, it was often impossible to find large enough terraces and distinct plant communities were observed at different elevations, so 5-m radius plots were chosen instead. Groundcover, *i.e.*, all non-woody plants and woody plants less than 1 m tall, were assessed in a $1m^2$ representative plot. An exception was made for *Arudinaria gigantea* taller than 1.5-2 m: it clearly belonged to the next stratum and directly competed with shrubs, not groundcover, therefore it was placed in shrubs category. Abundance of shrubs, vines, and herbs was quantified as either density, if plants of similar size occupied the stratum, or actual areal cover. Relative abundance of woody vegetation was quantified by circumference at breast height (Fig. A-1, Appendix 1). Dominance was assessed using the 1987 manual 50/20 rule. Wetland indicator status was determined using the USDA Plants database for Region 2.

Numerical value was assigned to each plant indicator status (1 for OBL to 11 for UPL) and weighted averages method was employed to calculate overall dominance. Hygrophyte dominance was calculated separately for each stratum but the overall plant density in the stratum was noted as well (*i.e.*, very sparsely populated herb stratum is negligible in biomass compared to the tree stratum). Additionally, an existing list of vegetation occurring in the park (Walker 1997) was analyzed for the presence of hydrophytes.

Hydrology

Visual observation of primary (inundation, drift lines, sediment deposits, drainage patters) and secondary (oxidized root channels and water-stained leaves) indicators was

conducted on each site. Soil saturation was determined as described in Richards Chinn's manual (2006). Duration of inundation or saturation had to be at least 5% of the growing season. Growing season is defined as the portion of the year when soil temperature is above biological zero (5 C). In Vicksburg, Mississippi, the growing season is approximately 250 days long, and soil saturation has to be observed for at least 13 continuous days during the period from March to November.

Soil

Soil was sampled using soil auger and probe to the depth of 12 inches (Fig. A-2, Appendix 1). Soil texture was described using field determination methods from Richards Chinn's manual (2006). Munsell® Soil Color Chart was used to determine soil color. Soil redox potential was assessed either using 0.2% α, α'-dipyridyl solution buffered with 1N ammonium acetate for detecting ferrous iron or indirectly by the presence of hydrogen sulfide smell, indicative of highly reduced conditions (≤-150mV). Hydric indicators were described according to the 1987 Manual as well as National Hydric Soil Indicators (Hurt *et al.* 1998). Ephemeral creek beds do not automatically warrant wetland status since they may not hold water for sufficient time to develop anaerobic conditions, so they were surveyed along with their adjacent areas to determine whether duration criteria were satisfied.

Results and Discussion

Wetland Indicators

Vegetation

In general, gullies, slopes, and stream banks of the park are dominated by hydrophytic vegetation (from FAC to FACW+, see Table 2 for indicator explanation). Analysis of separate strata shows that woody vegetation is often more hydrophytic than its understory. This is likely to be related to deeper wetland hydrology and/or seasonal soil saturation.

Many hydrophytic plant communities include boxelder (*Acer negundo*), sycamore (*Platanus occidentalis*), sugarberry (*Celtis laevigata*), sweetgum (*Liquidambar styraciflua*), and, less frequently, willow oak (*Quercus phellos*), swamp chestnut oak (*Q. michauxii*), water oak (*Q. nigra*), and American hornbeam (*Carpinus caroliniana*) as canopy-forming vegetation with giant cane (*Arundinaria gigantea*) and scouringrush horsetail (*Equisetum hyemale*) in the understory (Figs. 1 and 2). Understory vegetation was often dominated by invasive plants, which complicated determination of its wetland status. For example, English ivy (*Hedera helix*) is a non-hydrophyte but was nevertheless observed in mesic areas of the park, displacing hydrophytic vegetation (Fig. 3). A list of commonly occurring plants and their indicator status is presented in Table 1.

A very similar palustrine forested wetland plant community was observed in East Texas by Tiner (1999). This community was dominated by boxelder, *Acer negundo*; water oak, *Quercos nigra*; sugarberry, *Celtis laevita*; and hornbeam, *Carpinus caroliniana* and included the following associated vegetation: sycamore, *Platanus occidentalis*; giant cane, *Arudinaria gigantea*; elder, *Sambucus candensis*, *Galium* sp., *Viola* sp., etc. This plant community was classified as mixed hardwood swamp.

Fig. 1. Scouring rush-boxelder riverine wetland community

Fig. 2. Giant cane-sycamore riverine wetland community

Fig. 3. Riverine wetland overgrown by English ivy.

Hydrology

Several primary wetland hydrology indicators were observed in the park. Most commonly, soil was saturated in the upper 12 inches, often months after the last rain. Loamy soils are well-drained and this saturation most likely indicates continuous seepage along the gravitational gradient. Stream-adjacent sites had water marks in the form of moss lines on tree trunks and, infrequently, buttressing. Drift lines, drainage patterns, and sediment deposits were observed in some cases; however, these features, independent of the duration of flooding, were assessed conservatively. Only non-vegetated flats (stream beds) and the area between the railroad tracks and the Yazoo canal experienced prolonged inundation (Fig. 4).

The most common secondary indicators were oxidized root channels and positive FAC-neutral test (indicating dominance of hydrophytes disregarding facultative vegetation). Some sites also had water-stained leaves, especially in ephemeral creek beds. The actual seepage wetlands have insufficient duration of inundation to display this feature, while duration of saturation is sufficient to display other indicators and be qualified as a wetland. Cautious interpretation of hydrology indicators is needed because of the unusual drought in the summer and fall of 2007 (USGS Drought Watch).

Fig. 4. Inundation of lower Mint Springs wetland by Yazoo flooding.

Soils

According to the Soil Survey maps, most of the park is described as Gullied land, which is not practical to classify as soil. These are young, recently deposited, and undifferentiated soils but may also include exposed bedrock. Soils from the less eroded parts of the park belong to Adler (Ad) and Memphis (MnD3, MeC3) series and are mostly silt loam by texture. Soil in the National Cemetery is classified by the Soil Survey Series as Silty land

(SsF), similar in material to Memphis silt loam but greatly modified. This area (the National Cemetery) was not sampled due to the expected lack of indicators in the modified soil and historical significance of the site.

On-site determination confirmed weak profile development in most areas of the park. Therefore, soil was not classified and three of the 1987 manual Hydric Soil indicators were not applicable: Aquic Moisture Regime; Listed on Local Hydric Soils and National Hydric Soils List. In the absence of profile development, the overall color pattern, mottles, and other properties were described. It was not possible to use the dipyridyl indicator, possibly due to the presence of unidentified interfering compounds or low iron content.

The most common soil textures were sandy loam and loamy sand except for the lower part of Mint Springs, which had sandy clay loam. Predominant soil colors were brown and yellowish brown (10YR 4/3 and 4/4, Munsell® Soil Color Chart) but other colors were observed as well. The 1987 Corps manual lists sandy and recently deposited soils as potential problem areas for determination as they may not posses any typical hydric soil properties. Not surprisingly, hydric soil indicators were observed less frequently than vegetation and hydrology indicators. Stream bank and ephemeral creek soils sometimes had hydrogen sulfide, indicative of very reduced, anaerobic conditions. These soils often had gleyed matrix (*e.g.*, site 30 at the South Loop, see Appendix 2, Table A.1 for data forms) or prominent gleyed inclusions (*e.g.*, site 101 at Thayer's approach).

Soil samples from many areas contained organic remains such as partially decomposed leaves, roots and unidentifiable plant tissues throughout the upper 12 in. High organic content was observed in the surface layer of some soil samples; however, this layer was never thicker than 2-3 cm. Most common distinction between hydric and nearby non-

hydric soils was the presence of redox depletions (gray colors), redox concentrations (red colors), and stratified soil with differently colored layers some of which appeared leached (light yellow with chroma 2 or less, or gley). This type of soil was frequently observed on slopes and in the gullies and areas adjacent to the streams or ephemeral creek beds.

Classification and mapping

Park wetlands belong to one of the following Cowardin *et al.* (1979) categories: 1. streams are Riverine, Upper perennial, Unconsolidated bottom (Fig. 5); 2. creeks are Riverine, Intermittent, Streambed; and 3. forested wetlands are Palustirne, Forested Wetlands. The following modifiers apply: all wetlands are non-tidal, seasonally flooded/saturated; inland fresh, circumneutral; on mineral soil. Some slope wetlands (see below) also had wetlands belonging to the Moss/Lichen class (Fig. 6); these are too small to be mapped separately but are nevertheless important for habitat heterogeneity. According to Brinson's Hydrogeomorphic Classification (HGM, 1993), VNMP wetlands belong to either riverine or slope (Fig. 7) hydrogeomorphic class.

Functionally, forested wetlands are seepage or slope wetlands, which are recharged from rainwater that percolates from higher elevations and contributes to seepage, subsurface, and sheet flows. While geology of the area was not studied, it is hypothesized that seepage occurs due to longitudinal orientation of deep strata and/or presence of impermeable strata (e.g, Stein et al., Tiner, 1999). Recharge depends on regional factors such as precipitation and local factors such as slope. A thorough understanding of the recharge mechanism is necessary for assessing potential impact of management actions on wetlands and adjacent non-wetland areas. According to disturbance level criteria (Cole *et al.* 1997), most seepage and riverine

wetlands in the park were judged pristine to moderately disturbed (primarily by up-stream modifications and invasive plants), except for modified wetlands that appeared severely disturbed.

Wetlands were mapped in ArcMap® (ESRI) to the best resolution available for current digital elevation models (MARIS). Ephemeral creek wetlands and unconsolidated bottom riverine wetlands were not mapped separately because at the available resolution they would appear as line features (due to their small size). HGM slope and riverine wetlands are mapped together because they are not hydrologically distinct (Fig. A-3, Appendix 2). For forested wetlands, topography may be more useful for making on-site management decisions than a map, because the latter may not show enough detail on this very complex and dissected landscape. Seepage wetlands are very patchy by nature but, as a useful approximation for ecosystem-oriented management, most slopes with seepage-saturated soils, gullies, ephemeral creek beds, and streams are to be considered wetlands.

Fig. 5. An example of Riverine, Upper Perennial, Unconsolidated Bottom wetland.

Fig. 6. An example of Moss-Lichen seepage wetland (Note that *Pteris multifida* is an exotic species and is not a wetland indicator).

Fig. 7. An example of Palustrine, Forested seepage wetland (on slopes only).

Wetland functions

Wetland functions are commonly assessed using hydrologic, biogeochemical, and biologic function criteria. Hydrologic functions of slope wetland commonly include ground and surface water interception and water retention and groundwater export. Water interception is a fundamental property of slope wetlands (Stein *et al.* 2004). Removal of vegetation outside of park boundaries as well as in some areas of the park may have led to increased siltation in nearby streams (Dibble, 2003). Therefore, forested wetlands of the park may play an important role in control of erosion and siltation. Dense growth of Chinese privet may compromise this and habitat wetland functions: observations indicate very sparse herb and other shrub cover and lack of extensive root system in gullies overgrown with privet, whereas nearby areas dominated by giant cane (*Arundinaria gigantea*) had a more extensive root system in the upper part of the soil (Fig. 2).

Water retention by seepage wetlands is essential for stream flow maintenance and integrity of the overall watershed. Study of slope wetlands in another part of the country has shown that ground-water levels remained near the surface for two to eight months, depending on the type of geologic setting (Stein *et al.* 2004). In this study, saturated soils were observed two months after the last significant precipitation. It is also possible that seepage wetlands prevent the soil from extreme desiccation, which may lead to changes in soil structure; therefore, this type of wetland is important for maintaining soil integrity and reducing erosion. Drier soil was observed in several areas of the park recently cleared of vegetation and reduced flows were observed in intermittent streams adjacent to cleared areas.

Biogeochemical functions of wetlands include organic carbon accumulation and export, retention and release of compounds, and nutrient cycling. These functions were not

assessed for park wetlands and their degree of importance cannot be extrapolated from the available data. Regional contribution of this type of function (downstream contribution to a major watershed) is likely to be correlated with watershed input contribution of park's streams.

Biological functions of wetlands consist of maintenance of plant and animal communities and regional and landscape biodiversity. Several obligatory wetland plants were observed in VNMP during floristic assessment (Walker 1997): water pennywort, *Hydrocotyle verticillata*; great blue lobelia, *Lobelia siphilitica*; redroot flatsedge, *Cyperus erythrorhizos*; smartweed, *Polygonum hydropiperoides*; water pimpernel, *Samolus floribundus*, etc. Presence of these species increases regional biodiversity because they would not be in the area if not for adequate hydrology and saturated soil conditions.

Park wetlands have relatively high habitat function: most seepage wetlands support diverse and locally unique plant communities. Several disturbance-sensitive plants, observed during implementation of this project, indicate high-quality habitat (*e.g.*, green dragon, *Arisaema dracontium*; American ginseng, *Panax quinquefolius*; Jack-in-the-pulpit, *Arisaema triphyllum*). Vicksburg NMP contains one of the few remaining tracts of loess bluff hardwood forests on public land in the United States (EAS 2004); therefore, these wetlands support plant communities that are regionally rare. Slope wetlands from other parts of the country have been shown to have relatively high plant and wildlife habitat function, disproportionate to their small area (*reviewed in* Stein *et al.* 2004). Some areas had lower habitat quality due to the presence of invasive species, especially English ivy and Chinese privet.

Some classification systems also include educational function – this function level is potentially high, since the area contains many trails intersecting high quality, regionally unique habitats, and also by virtue of it being a National Park. It is also interesting that several different types of wetlands occur within a park.

Impacted wetlands

Most common modification was clear-cutting of vegetation. These areas were assessed using only the soil criterion, in accordance with the 1987 manual treatment of *Problem Areas*. Several sites had modification in the form of drainage culverts; however, these sites were characterized as having *Normal Circumstances* since canopy-forming vegetation was present and appeared undisturbed.

Former/relict wetlands

Several modified areas were expected to have wetland soils but did not (e.g., sites 96-99). Possible reasons include very thick recent deposition due to extreme erosional events (upper 12 inches represented last few years instead of decades) in which wetland characteristics did not have time to develop, and in some areas also due to drying of the soil after vegetation removal. It is therefore impossible to determine whether those areas were formerly a wetland.

Potential for restoration

Based on qualitative observation of modified areas, hydrology and even soils appear altered after clearing; therefore, the potential for restoration is low. Seepage wetlands in

general are very difficult to restore due to their complex hydrodynamics. Riverine wetlands may have a greater restoration potential if the upstream flow is not altered; however, a detailed analysis of recharge mechanisms is necessary to make predictions of management impacts.

On the contrary, unmodified wetlands (satisfying Normal Circumstances criterion, which in this case means that natural vegetation is present), have a relatively high potential for restoration: habitat functions can be improved by control of invasive plants.

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Table 1. Plants encountered in transects and their wetland status.

Common name	Latin name	Stratum	Status
American beech	*Fagus grandifolia*	4-trees	FACU
American ginseng	*Panax quinquefolius*	1- herbs	UPL
American holly	*Ilex opaca*	2-shrubs	FAC-
American hornbeam	*Carpinus caroliniana*	4-trees	FAC
Asian netvein hollyfern	*Cyrtomium fortunei*	1- herbs	NI
birdeye speedwheel	*Veronica persica*	1- herbs	NI
bitternut hickory	*Carya cordiformis*	4-trees	FAC
black cherry	*Prunus serotina*	2-shrubs	FACU
blackberry	*Rubus argutus*	2-shrubs	FACU+
boxelder	*Acer negundo*	4-trees	FACW
Chinaberrytree	*Melia azedarach*	2-shrubs	NI
Christmas fern	*Polystichum acrostichoides*	1- herbs	FAC
cinnamon fern	*Osmunda cinnamomea*	1- herbs	FACW+
common ladyfern	*Athyrium filix-femina*	1- herbs	FAC
common persimon	*Diospyros virginiana*	2-shrubs	FAC
cutleaf geranium	*Geranium dissectum*	1- herbs	NI
eastern cottonwood	*Populus deltoides*	4-trees	FAC+
eastern hayscented fern	*Dennstaedtia punctilobula*	1- herbs	UPL
eastern redbud	*Cercis canadensis*	2-shrubs	FACU
eastern redcedar	*Juniperus virginiana*	4-trees	FACU-
English ivy	*Hedera helix*	3-vines	NI
flowering dogwood	*Cornus florida*	2-shrubs	FACU
giant cane	*Arundinaria gigantea*	2-shrubs	FACW
green dragon	*Arisaema dracontium*	1- herbs	FACW
hardy orange	*Poncirus trifoliata*	2-shrubs	UPL
hobblebush	*Viburnum lantanoides*	2-shrubs	FAC
Japanese honeysuckle	*Lonicera japonica*	2-shrubs	FAC-
jumpseed	*Polygonum virginianum*	1- herbs	FAC
ladyfern	*Athyrium filix-femina*	1- herbs	FAC
muscadine	*Vitis rotundifolia*	3-vines	FAC
Nepalese browntop	*Microstegium vimineum*	1- herbs	FAC+
northern maidenhair	*Adiantum pedatum*	1- herbs	FACU
oakleaf hydrangea	*Hydrangea quercifolia*	2-shrubs	UPL
pecan	*Carya illinoinensis*	4-trees	FAC+
poison ivy	*Toxicodendron radicans*	3-vines	FAC
privet, chinese	*Ligustrum sinense*	1- herbs	FAC
red maple	*Acer rubrum*	2-shrubs	FAC

red mulberry	*Morus rubra*	2-shrubs	FAC
sand violet	*Viola affinis*	1- herbs	FACW
saw greenbrier	*Smilax bona-nox*	3-vines	FAC
scouringrush horsetail	*Equisetum hyemale*	1- herbs	FAC+
sedge, narrowleaf	*Carex amphibola*	1- herbs	FACW
silky dogwood	*Cornus amomum*	2-shrubs	FACW+
slippery elm	*Ulmus rubra*	4-trees	FAC
southern magnolia	*Magnolia grandiflora*	4-trees	FAC+
sugarberry	*Celtis laevigata*	4-trees	FACW
swamp chestnut oak	*Quercus michauxii*	4-trees	FACW-
sweetgum	*Liquidambar styraciflua*	4-trees	FAC+
sycamore	*Platanus occidentalis*	4-trees	FACW-
tulip tree	*Liriodendron tulipifera*	4-trees	FAC
Virginia creeper	*Parthenocissus quinquefolia*	3-vines	FAC
Virginia creeper	*Parthenocissus quinquefolia*	3-vines	FAC
water oak	*Quercus nigra*	4-trees	FAC
wild hydrangea	*Hydrangea arborescens*	2-shrubs	FACU
wild hydrangea	*Hydrangea arborescens L.*	2-shrubs	FACU
willow oak	*Quercus phellos*	4-trees	FACW-
willow, peachleaf	*Salix amygdaloides*	4-trees	FACW
wisteria	*Wisteria frutescens*	3-vines	FACW

Table 2. Explanation of wetland indicator status (*Source*: Reed 1988; USDA Plants).

Indicator Category	Probability of occurrence in wetlands	Status
Obligate wetland (OBL)	>99% of the time	Hydrophyte
Facultative wetland (FACW)	67-99%	Hydrophyte
Facultative (FAC)	34-66%	FAC, FAC+ Hydrophyte FAC- Non-hydrophyte
Facultative upland (FACU)	1-33%	Non-hydrophyte
Upland (UPL)	<1%	Non-hydrophyte
No Indicator (NI)	-	Not enough information

Table 3. Potential value of VNMP wetlands in terms of some of the common wetland functions

Wetland Function	**Level**	**Notes**
Removing sediment	Med	Indirect, by flow attenuation
Removing nutrients/phosphorus	No data	Likely short residence time
Removing nutrients/nitrogen	No data	See above
Removing metals and toxic organic compounds	No data	
Reducing downstream erosion and flooding	High	Flow attenuation
Recharging groundwater and streams	Local: High Regional: Minor	Important for stream flow maintenance, integrity of the watershed
General habitat	High	Locally unique and regionally rare habitats
Habitat for invertebrates	No data	
Habitat for amphibians	High	At least 5 species of salamanders and 12 species of Anurans (Keiser 2002)
Habitat for birds	Med/High	Neotropical migrant use
Habitat for aquatic mammals	Med	Riverine wetlands only
Richness of native plants	High	
Supporting food webs	No data	
Educational	High	Trails, uncommon plant communities

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Appendix 1

Fig. A-1. Measuring tree circumference for dominance assessment.

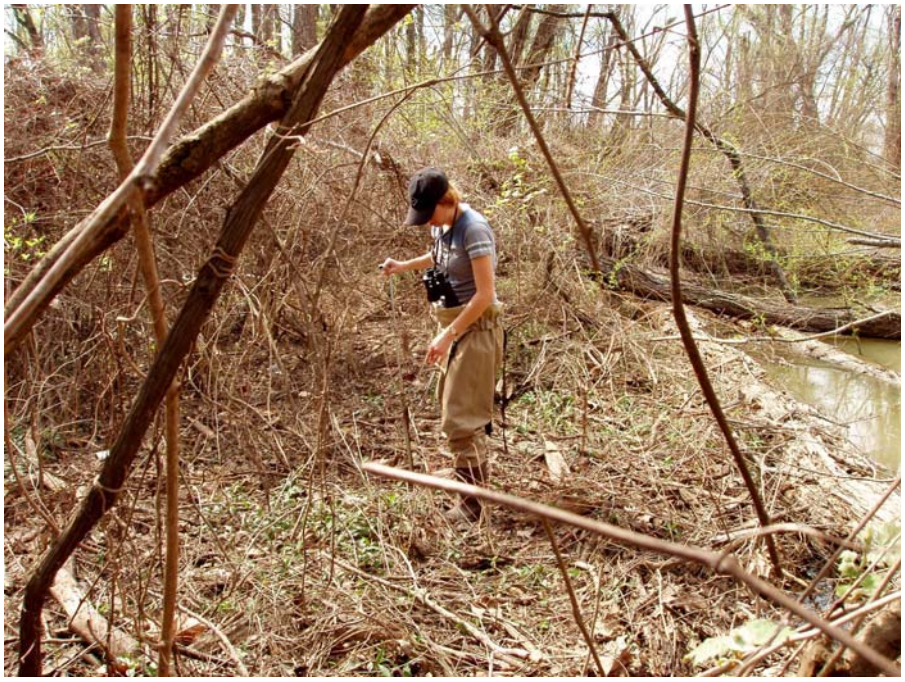

Fig. A-2. Sampling soil with a probe in a flooded riverine wetland.

Appendix 2

APPENDIX E

USGS LANDCOVER CLASSIFICATION

Vicksburg National Military Park
Mississippi

Landcover Classification

National Park Service
U.S. Department of the Interior

Notes:
- Association and Alliance Classifications based on the National Vegetation Classification System as were provided by the NPS.

October 2007

Appendix E: USGS Landcover Classification

APPENDIX F

VICKSBURG NATIONAL MILITARY PARK WILDLIFE AND HABITAT

Appendix F: Vicksburg National Military Park Wildlife and Habitat

Vicksburg National Military Park Environmental Assessment for Landscape Rehabilitation

Common Name (Technical Name)	Streams and Riparian Zones	Forested Wetlands	Cleared/ Herbaceous Wetlands	Forested Uplands	Cleared/ Herbaceous Uplands	[1] Edge or Generalist Habitat	[2] Locally Migrant	[3] Long-distance Migrant
Fish								
Fathead minnow (*Pimephales promelas*)	X						N	N
Amphibians								
American toad (*Bufo americanus*)		X		X			Y	N
Bull frog (*Rana catesbeiana*)	X	X					Y	N
Cope's gray treefrog (*Hyla chrysoscelis*)		X	X	X			Y	N
Eastern narrowmouth toad (*Gastrophryne carolinensis*)		X	X				Y	N
Eastern spadefoot (*Scaphiopus holbrookii*)	X			X			Y	N
Florida leopard frog (*Rana sphenocephala*)	X	X	X				Y	N
Fowler's toad (*Bufo fowleri*)		X		X			Y	N
Gray treefrog (*Hyla versicolor*)		X	X	X			Y	N
Gray treefrog complex (*Hyla* sp.)		X	X				Y	N
Green frog (*Rana clamitans*)	X	X	X				Y	N
Green treefrog (*Hyla cinerea*)	X	X	X				N	N
Longtail salamander (*Eurycea longicauda*)	X	X					N	N
Mississippi slimy salamander (*Plethodon mississippi*)	X	X					N	N
Mole salamander (*Ambystoma talpoideum*)		X		X			Y	N
Northern cricket frog (*Acris crepitans*)	X		X				N	N
Spotted dusky salamander (*Desmognathus fuscus*)	X	X					N	N
Spotted salamander (*Ambystoma maculatum*)		X					Y	N
Spring peeper (*Pseudacris crucifer*)		X		X			Y	N
Three-lined salamander (*Eurycea longicauda guttolineata*)	X	X					N	N
Reptiles								
Alligator snapping turtle (*Macroclemys temminckii*)	X		X				Y	N
Broadhead skink (*Eumeces laticeps*)		X		X			Y	N
Common garter snake (*Thamnophis sirtalis*)	X	X					Y	N
Common king snake (*Lampropeltis getula*)		X	X				N	N
Common musk turtle (*Sternotherus odoratus*)	X	X					N	N
Copperhead (*Agkistrodon contortrix*)				X			Y	N
Corn snake (*Elaphe guttata*)				X	X		N	N
Cottonmouth (*Agkistrodon piscivorus*)	X				X		Y	N
Eastern box turtle (*Terrapene carolina*)		X		X			N	N
Eastern racer (*Coluber constrictor*)					X		Y	N
Eastern ratsnake (*Elaphe obsoleta*)		X			X		Y	N
Eastern river cooter (*Pseudemys concinna*)	X	X					N	N
Eastern worm snake (*Carphophis amoenus*)				X			N	N
False map turtle (*Graptemys pseudogeographica*)	X						N	N

Common Name (Technical Name)	Streams and Riparian Zones	Forested Wetlands	Cleared/ Herbaceous Wetlands	Forested Uplands	Cleared/ Herbaceous Uplands	[1] Edge or Generalist Habitat	[2] Locally Migrant	[3] Long-distance Migrant
Five-lined skink (*Eumeces fasciatus*)	X			X			N	N
Green anole (*Anolis carolinensis*)		X		X			N	N
Ground skink (*Scincella lateralis*)	X			X			N	N
Mississippi map turtle (*Graptemys pseudogeographica*)	X	X	X				N	N
Northern water snake (*Neropia sipedon*)		X	X				N	N
Ouachita map turtle (*Graptemys ouachitensis*)	X						N	N
Painted turtle, southern (*Chrysemys dorsalis*)	X	X					N	N
Painted turtle, northern (*Chrysemys picta*)	X	X	X				Y	N
Plainbellied water snake (*Nerodia erythrogaster*)	X	X	X				N	N
Red-bellied snake (*Storeria occipitomaculata*)	X			X			Y	N
Ringneck snake (*Diadophis punctatus*)				X	X		Y	N
Rough green snake (*Opheodrys aestivus*)		X		X			N	N
Slider (*Trachemys scripta*)	X	X					N	N
Snapping turtle (*Chelydra serpentinA*)	X	X	X				Y	N
Timber rattlesnake (*Crotalus horridus*)		X	X	X	X		Y	N
Birds								
Acadian flycatcher (*Empidonax virescens*)		X		X			N	Y
American goldfinch (*Carduelis tristis*)	X	X	X	X	X	X	Y	Y
American crow (*Corvus brachyrhynchos*)	X	X	X	X	X	X	Y	Y
American redstart (*Setophaga ruticilla*)	X	X		X			N	Y
American robin (*Turdus migratorius*)	X	X	X	X	X	X	Y	Y
Bald eagle (*Haliaeetus leucocephalus*)	X	X		X			Y	Y
Baltimore oriole (*Icterus galbula*)	X	X	X	X	X	X	Y	Y
Barn swallow (*Hirundo rustica*)	X		X		X		N	Y
Barred owl (*Strix varia*)	X	X	X	X			Y	N
Belted Kingfisher (*Ceryle alcyon*)	X	X	X				Y	Y
Black vulture (*Coragyps atratus*)				X	X		Y	N
Black-and-white warbler (*Mniotilta varia*)	X	X		X			N	Y
Black-throated green warbler (*Dendroica virens*)	X	X	X	X	X	X	N	Y
Blackburnian warbler (*Dendroica fusca*)				X			N	Y
Blue jay (*Cyanocitta cristata*)	X	X	X	X	X	X	Y	Y
Blue grosbeak (*Passerina caerulea*)	X	X	X	X	X	X	Y	Y
Blue-gray gnatcatcher (*Polioptila caerulea*)	X	X	X	X	X	X	Y	Y
Blue-winged warbler (*Vermivora pinus*)	X	X	X	X	X	X	N	Y
Bobolink (*Dolichonyx oryzivorus*)			X		X		N	Y
Broad-winged hawk (*Buteo platypterus*)	X	X	X	X	X	X	N	Y
Brown thrasher (*Toxostoma rufum*)	X			X	X	X	Y	Y

Appendix F: Vicksburg National Military Park Wildlife and Habitat

Vicksburg National Military Park Environmental Assessment for Landscape Rehabilitation

Common Name (Technical Name)	Streams and Riparian Zones	Forested Wetlands	Cleared/ Herbaceous Wetlands	Forested Uplands	Cleared/ Herbaceous Uplands	[1] Edge or Generalist Habitat	[2] Locally Migrant	[3] Long-distance Migrant
Brown-headed cowbird (*Molothrus ater*)	X	X	X	X	X	X	Y	Y
Canada goose (*Branta canadensis*)	X		X		X		Y	Y
Carolina chickadee (*Poecile carolinensis*)	X	X	X	X	X	X	N	N
Carolina wren (*Thryothorus ludovicianus*)	X	X	X	X	X	X	N	N
Cardinal (*Cardinalis cardinalis*)	X	X	X	X	X	X	N	N
Cattle egret (*Bubulcus ibis*)	X	X	X				Y	Y
Cedar waxwing (*Bombycilla cedrorum*)	X			X	X	X	Y	Y
Chimney swift (*Chaetura pelagica*)				X			N	Y
Chipping sparrow (*Spizella passerina*)	X			X	X	X	Y	Y
Common grackle (*Quiscalus quiscula*)	X	X	X	X	X	X	Y	Y
Common yellowthroat (*Geothlypis trichas*)	X	X	X				Y	Y
Double-crested cormorant (*Phalacrocorax auritus*)	X	X					Y	Y
Downy woodpecker (*Picoides pubescens*)	X	X	X	X	X	X	Y	N
Eastern bluebird (*Sialia sialis*)	X			X	X	X	Y	Y
Eastern kingbird (*Tyrannus tyrannus*)	X	X	X	X	X	X	N	Y
Eastern towhee (*Pipilo erythrophthalmus*)	X	X	X	X	X	X	Y	Y
Eastern wood-pewee (*Contopus virens*)	X			X	X	X	N	Y
Eurasian collared dove (*Streptopelia decaocto*)	X			X	X		N	N
European starling (*Sturnus vulgaris*)	X	X	X	X	X	X	Y	N
Fish crow (*Corvus ossifragus*)	X	X	X				Y	N
Gray catbird (*Dumetella carolinensis*)	X			X	X	X	Y	Y
Great blue heron (*Ardea herodias*)	X	X	X				Y	Y
Great crested flycatcher (*Myiarchus crinitus*)	X	X	X	X	X	X	N	Y
Great egret (*Ardea alba*)	X	X	X		X		Y	Y
Hairy woodpecker (*Picoides villosus*)	X	X		X			Y	N
Hermit thrush (*Catharus guttatus*)	X	X		X			Y	Y
Hooded warbler (*Wilsonia citrina*)	X	X		X			N	Y
House finch (*Carpodacus mexicanus*)	X			X	X	X	Y	Y
House sparrow (*Passer domesticus*)					X		N	N
Indigo bunting (*Passerina cyanea*)	X			X	X	X	N	Y
Kentucky warbler (*Oporornis formosus*)	X	X		X			N	Y
Kinglet (*Regulus calendulus* or *satrapa*)				X			Y	Y
Little blue heron (*Egretta caerulea*)	X	X	X				Y	Y
Loggerhead shrike (*Lanius ludovicianus*)					X		Y	Y
Mississippi kite (*Ictinia mississippiensis*)	X	X	X	X	X	X	N	Y
Mourning dove (*Zenaida macroura*)	X			X	X	X	Y	Y
Northern cardinal (*Cardinalis cardinalis*)	X	X	X	X	X	X	N	N

Common Name (Technical Name)	Streams and Riparian Zones	Forested Wetlands	Cleared/ Herbaceous Wetlands	Forested Uplands	Cleared/ Herbaceous Uplands	[1] Edge or Generalist Habitat	[2] Locally Migrant	[3] Long-distance Migrant
Northern flicker (*Colaptes auratus*)	X			X	X	X	Y	Y
Northern mockingbird (*Mimus polyglottos*)	X			X	X	X	N	N
Northern parula (*Parula americana*)	X	X		X			N	Y
Northern rough-winged swallow (*Stelgidopteryx serripennis*)	X		X		X		Y	Y
Orchard oriole (*Icterus spurius*)	X			X	X	X	N	Y
Pileated woodpecker (*Dryocopus pileatus*)	X			X			N	N
Pine warbler (*Dendroica pinus*)				X			Y	Y
Prairie warbler (*Dendroica discolor*)	X	X	X	X	X	X	Y	Y
Prothonotary warbler (*Prothonotaria citrea*)	X	X		X			N	Y
Purple martin (*Progne subis*)	X		X		X		N	Y
Red-bellied woodpecker (*Melanerpes carolinus*)	X	X		X			N	N
Red-eyed vireo (*Vireo olivaceus*)	X	X		X			N	Y
Red-headed woodpecker (*Melanerpes erythrocephalUs*)	X			X	X	X	Y	N
Red-shouldered hawk (*Buteo lineatus*)	X	X		X	X	X	Y	Y
Red-tailed hawk (*Buteo jamaicensis*)	X			X	X	X	Y	Y
Red-winged blackbird (*Agelaius phoeniceus*)	X	X	X				Y	Y
Rock pigeon (*Columba livia*)	X				X		N	N
Rose-breasted grosbeak (*Pheucticus ludovicianus*)	X	X		X	X	X	N	Y
Ruby-crowned kinglet (*Regulus calendula*)				X	X		Y	Y
Ruby-throated hummingbird (*Archilochus colubris*)	X	X	X	X	X	X	Y	Y
Sedge wren (*Cistothorus platensis*)	X		X		X		Y	Y
Sharp-shinned hawk (*Accipiter striatus*)	X			X			Y	Y
Summer tanager (*Piranga rubra*)	X			X	X	X	N	Y
Swainson's warbler (*Limnothlypis swainsonii*)	X	X		X			N	Y
Tennessee warbler (*Vermivora peregrina*)	X	X	X	X	X	X	N	Y
Turkey vulture (*Cathartes aura*)	X	X		X	X		Y	Y
Tufted titmouse (*Baeolophus bicolor*)	X			X	X	X	N	N
White-eyed vireo (*Vireo griseus*)	X			X	X		Y	Y
White-throated sparrow (*Zonotrichia albicollis*)	X		X	X	X	X	N	Y
Wild turkey (*Meleagris gallopavo*)				X	X	X	N	N
Wood duck (*Aix sponsa*)	X	X	X	X			Y	Y
Wood thrush (*Hylocichla mustelina*)	X	X		X			N	Y
Worm-eating warbler (*Helmitheros vermivorus*)	X			X			N	Y
Yellow-bellied sapsucker (*Sphyrapicus varius*)	X			X	X		Y	Y
Yellow-billed cuckoo (*Coccyzus americanus*)	X		X	X	X	X	N	Y
Yellow-breasted chat (*Icteria virens*)	X	X	X	X	X	X	N	Y
Yellow-rumped warbler (*Dendroica coronata*)		X		X			Y	Y

Common Name (Technical Name)	Streams and Riparian Zones	Forested Wetlands	Cleared/ Herbaceous Wetlands	Forested Uplands	Cleared/ Herbaceous Uplands	[1] Edge or Generalist Habitat	[2] Locally Migrant	[3] Long-distance Migrant
Yellow-throated vireo (*Vireo flavifrons*)	X	X	X	X	X	X	N	Y
Yellow-throated warbler (*Dendroica dominica*)	X	X		X			N	Y
Mammals								
Beaver (*Castor canadensis*)	X						N	N
Big brown bat (*Eptesicus fuscus*)	X			X			N	N
Bobcat (*Lynx rufus*)	X	X		X			N	N
Brazilian free-tailed bat (*Tadarida brasiliensis*)	X			X			Y	Y
Cotton mouse (*Peromyscus gossypinus*)	X	X		X			N	N
Coyote (*Canis latrans*)	X			X	X	X	N	N
Eastern chipmunk (*Tamias striatus*)				X	X		N	N
Eastern cottontail rabbit (*Sylvilagus floridanus*)	X	X	X	X	X	X	N	N
Eastern fox squirrel (Sciurus niger)	X			X	X	X	N	N
Eastern harvest mouse (*Reithrodontomys humulis*)			X		X		N	N
Eastern mole (*Scalopus aquaticus*)				X	X		N	N
Eastern pipistrelle (*Pipistrellus subflavus*)	X			X	X		Y	N
Eastern red bat (*Lasiurus borealis*)	X			X	X		N	N
Eastern woodrat (*Neotoma floridana*)	X	X		X			N	N
Evening bat (*Nycticeius humeralis*)	X			X	X		Y	Y
Gray fox (*Urocyon cinereoargenteus*)	X	X		X	X		N	N
Gray squirrel (*Sciurus carolinensis*)	X			X	X	X	N	N
Hispid cotton rat (*Sigmodon hispidus*)	X		X		X		N	N
Hoary Bat (*Lasiurus cinereus*)	X			X			N	Y
House mouse (*Mus musculus*)				X	X		N	N
Least shrew (*Cryptotis parva*)	X	X	X	X	X	X	N	N
Long-tailed weasel (*Mustela frenata*)	X	X	X	X	X	X	N	N
Nine-banded armadillo (*Dasypus novemcinctus*)	X			X	X		N	N
Nutria (*Myocastor coypus*)	X	X	X				N	N
Pine Vole (*Microtus pinetorum*)	X	X	X	X	X		N	N
Raccoon (*Procyon lotor*)	X	X		X		X	N	N
Red fox (*Vulpes fulvus*)	X			X	X	X	N	N
Seminole Bat (*Lasiurus seminolus*)	X	X		X	X		N	N
Southeastern shrew (*Sorex longirostris*)	X	X	X	X			N	N
Southern short-tailed shrew (*Blarina carolinensis*)	X			X	X		N	N
Southern flying squirrel (*Glaucomys volans*)	X			X			N	N
Spotted skunk (*Spilogale putorius*)	X			X	X	X	N	N
Striped skunk (*Mephitis mephitis*)	X	X	X	X	X	X	Y	N
Swamp rabbit (*Sylvilagus aquaticus*)	X	X	X				N	N

Appendix F: Vicksburg National Military Park Wildlife and Habitat

Vicksburg National Military Park Environmental Assessment for Landscape Rehabilitation

Common Name (Technical Name)	Streams and Riparian Zones	Forested Wetlands	Cleared/ Herbaceous Wetlands	Forested Uplands	Cleared/ Herbaceous Uplands	[1] Edge or Generalist Habitat	[2] Locally Migrant	[3] Long-distance Migrant
Virginia oppossum (*Didelphis virginiana*)	X	X	X	X	X	X	N	N
White-footed mouse (*Peromyscus leucopus*)	X			X	X	X	N	N
White-tailed deer (*Odocoileus virginianus*)	X	X		X	X	X	Y	N

Sources:

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[2] Locally Migrant (Natureserve, 2009): Indicates this species makes local extended movements (generally less than 200 km) at particular times of the year (e.g., to breeding or wintering grounds, to hibernation sites).

[3] Long Distance Migrant (Natureserve, 2009): Indicates populations make annual migrations of over 200 km.

APPENDIX G

IMPACT TOPIC THRESHOLD DEFINITIONS

APPENDIX G

IMPACT TOPIC THRESHOLD DEFINITIONS

The terms of potential impacts are described as follows:

- Type – Are the impacts beneficial or adverse?
- Context – Are the impacts site-specific, local, or regional?
- Duration – Are the impacts short-term, lasting less than one year, or long-term, lasting more than one year?
- Intensity – Are the impacts negligible, minor, moderate, or major?

Specific impact definitions apply to each of the impact topics addressed in this EA. The definitions are defined in terms of intensity (negligible, minor, moderate, and major) and duration (short-term and long-term).

Recreational Resources, Aesthetics, and Visitor Experience

Negligible: Visitors would not be impacted, or changes in visitor use and/or experience would be below or at the level of detection. Any impacts would be short-term. The visitor would not likely be aware of the impacts associated with the alternative.

Minor: Adverse and beneficial changes in visitor use and/or experience would be detectable, although the changes would be slight. The visitor would be aware of the impacts associated with the alternative, but the impacts would be slight.

Moderate: Adverse and beneficial changes in visitor use and/or experience would be readily apparent. The visitor would be aware of the impacts associated with the alternative and would likely be able to express an opinion regarding the changes.

Major: Adverse and beneficial changes in visitor use and/or experience would be readily apparent and have important consequences. The visitor would be aware of the impacts associated with the alternative and would likely express a strong opinion regarding the changes.

Duration: Short-term – Impacts occur only during project implementation activities.

Long-term – Impacts extend beyond project implementation activities.

Cultural Resources

Cultural Landscapes

Negligible: The impact is at the lowest levels of detection or barely perceptible and not measurable. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Minor: Adverse impact - The impact would not affect the character-defining features of a cultural landscape listed on or eligible for listing on the National Register. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Beneficial impact - Character-defining features would be preserved in accordance with the Secretary of the Interior's Standards, therefore maintaining the integrity of the cultural landscape. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Moderate: Adverse impact - The impact would alter a character-defining feature or features of the cultural landscape but would not diminish the integrity of the landscape to the extent that its National Register eligibility would be jeopardized. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Beneficial impact - The landscape or its features would be rehabilitated in accordance with the Secretary of the Interior's Standards to make possible a compatible use of the landscape while preserving its character-defining features. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Major: Adverse impact - The impact would alter a character-defining feature(s) of the cultural landscape, diminishing the integrity of the resource to the extent that it would no longer be eligible to be listed on the National Register. For purposes of Section 106, the determination of effect would be *adverse effect*.

Beneficial impact - The cultural landscape would be restored in accordance with the Secretary of the Interior's Standards to accurately depict the features and character of a landscape as it appeared during its period of significance. For purposes of Section 106, the determination of effect would be no *adverse effect*.

Duration:
- Short-term – Impacts on the natural elements of a cultural resource may be comparatively short-term (*e.g.*, three to five years) until new vegetation grows or historic plantings are restored.
- Long-term – Impacts on the natural elements longer than three to five years.

Historic Resources

Negligible: The impact would be at the lowest level of detection or barely perceptible and not measurable. For purposes of Section 106, the determination of effect would be no adverse effect.

Minor: Adverse impact - The impact would not affect the character-defining features of a historic resource listed on or eligible for listing on the National Register. For purposes of Section 106, the determination of effect would be *no adverse effect.*

Beneficial impact - The character-defining features would be stabilized and/or preserved in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties (NPS 1995) to maintain the existing integrity of the historic resource. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Moderate: Adverse impact - The impact would alter a character-defining feature(s) of the historic resource but would not diminish the integrity of the resource to the extent that its National Register eligibility would be jeopardized. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Beneficial impact - The historic resource would be rehabilitated in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties to make possible a compatible use of the property while preserving its character-defining features. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Major: Adverse impact - The impact would alter a character-defining feature(s) of the historic resource, diminishing the integrity of the resource to the extent that it is no longer eligible to be listed on the National Register. For purposes of Section 106, the determination of effect would be *adverse effect*.

Beneficial impact - The historic resource would be restored in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties to depict accurately its form, features, and character as it appeared during its period of significance. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Duration: Short-term – Impacts on the natural elements of a cultural resource may be comparatively short-term (e.g., three to five years) until new vegetation grows or historic plantings are restored.

Long-term – Impacts on the natural elements longer than three to five years.

Archeological Resources

Negligible: The impact on archeological sites is at the lowest level of detection, barely perceptible and not measurable. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Minor: The impact on archeological sites is measurable or perceptible, but it is slight and localized within a relatively small area of a site or group of sites. The impact does not affect the character-defining features of a listed or eligible National Register archeological site and would not have a permanent effect on the integrity of any archeological sites. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Moderate: The impact is measurable and perceptible. The impact changes one or more character-defining feature(s) of an archeological resource but does not diminish the integrity of the resource to the extent that its National Register eligibility is jeopardized. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Major: The impact on archeological sites is substantial, noticeable, and permanent. The impact is severe or is of exceptional benefit. For National Register-eligible or listed archeological sites, the impact changes one or more character-defining features(s) of an archeological resource, diminishing the integrity of the resource to the extent that it is no longer eligible for listing in the National Register. For purposes of Section 106, the determination of effect would be adverse effect. A major impact can also be one of exceptional benefit. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Duration: Short-term – Impacts on the natural elements of a cultural resource may be comparatively short-term (e.g., three to five years) until new vegetation grows or historic plantings are restored.

Long-term – Impacts on the natural elements longer than three to five years.

Natural Resources

Soils and Geologic Hazards

Negligible: Soils would not be impacted, or the impacts on soils would be below or at the lower levels of detection. Any impact on soil characteristics and erosion rates would be slight and would return to normal shortly after project implementation activities.

Minor: Adverse and beneficial impacts on soils would be detectable, but likely short-term. Impacts on soil characteristics and erosion rates would be small. If mitigation were needed to offset adverse impacts, it would be relatively simple to implement and would likely be successful.

Moderate: Adverse and beneficial impacts on soil characteristics and erosion rates would be readily apparent and long-term, and result in a change to the soil character over a relatively wide area.

Major: Adverse and beneficial impacts on soil characteristics and erosion rates would be readily apparent and long-term, and would substantially change the character of the soils over a large area in and out of the park. Mitigation measures to offset adverse impacts would be needed and extensive, and their success would not be guaranteed.

Duration: Short-term – Impacts on soils and geologic resources would last less than one year.

Long-term – Impacts on soils and geologic resources would last more than one year.

Air Quality

Negligible: Air quality would not be impacted, or the impacts on air quality would be below or at the lower levels of detection. Any impact on air quality would be slight and would return to normal shortly after project implementation activities.

Minor: Adverse and beneficial impacts on air quality would be measurable, although the changes would be small and short-term, and the impacts would be localized, temporary, and limited to sensitive resources. For adverse impacts, no air quality mitigation measures would be necessary.

Moderate: Adverse and beneficial impacts on air quality would be measurable and would have noticeable benefits or consequences, although the impact would be relatively local. For adverse impacts, all air quality standards would still be met. There would be short-term exposure to sensitive resources. Air quality mitigation measures would be necessary, and the measures would likely be successful.

Major: Changes in air quality would be measurable, would have substantial benefits or consequences, and would be noticed regionally. For adverse impacts, there would be possible violations of state and federal air quality standards, violation of Class II air quality standards, and/or prolonged exposure to sensitive receptors. Air quality mitigation measures would be necessary, and the success of the measures could not be guaranteed.

Duration: Short-term – Impacts on air quality would last less than one year.

Long-term – Impacts on air quality would last more than one year.

Surface Water Quality and Streamflow Characteristics

Negligible: Impacts would not be detectable. For adverse impacts, water quality parameters would be well below all water quality standards for the designated use of the water. Both quality and quantity of flows would be within historical conditions.

Minor: Adverse and beneficial impacts would be measurable, but water quality parameters would be well within all water quality standards for the designated use. Both quality and quantity of flows would be within the range of historical conditions.

Moderate: Adverse and beneficial impacts on water quality would be readily apparent, but water quality parameters would be within all water quality standards for the designated use. Water quality or flows would be outside historic baseline on a limited time and space basis. For adverse impacts, mitigation would be necessary to offset adverse impacts, and would likely be successful.

Major: Adverse and beneficial impacts on water quality would be readily measurable. For adverse impacts, some quality parameters would periodically be approached, equaled, or exceeded. Flows would be outside the range of historic conditions, and could include flow cessation or flooding. Extensive mitigation measures would be necessary, and their success would not be ensured.

Duration: Short-term – Following implementation activities, impacts on surface water would last less than one year.

Long-term – Following implementation activities, impacts on surface water would last more than one year.

Floodplains and Wetlands

Negligible: Impacts would not be detectable. Both quality and quantity of flows would be within historical conditions.

Minor: Adverse and beneficial impacts would not result in alteration of natural hydrology of wetlands or floodplains. A USACE 404 permit would not be required. There would be no filling or disconnecting of the floodplain. The functionality of the floodplain would not be impacted. For adverse impacts, no mitigation measure associated with floodplains or wetlands would be necessary.

Moderate: Adverse and beneficial alteration of natural hydrology of wetlands or floodplains would be apparent such that a USACE 404 permit could be required. Alteration of the floodplain would be apparent. Wetland or floodplain functions would not be impacted in the long term. For adverse impacts, mitigation measures associated with floodplains or wetlands would be necessary and the measures would likely succeed.

Major: Adverse and beneficial impacts on wetlands or floodplains would be observable over a relatively large area, would be long-term, and would require a USACE 404 permit. Adverse impacts from filling or disconnecting the floodplain would occur. Long-term impacts would affect the functionality of the floodplain. For adverse impacts, mitigation measures would be necessary and their success would not be guaranteed.

Duration: Short-term – Following implementation activities, impacts on floodplains and wetlands would last less than one year.

Long-term – Following implementation activities, impacts on floodplains and wetlands would last longer than one year.

Vegetation (Including Invasive Species)

Negligible: Individual native plants may occasionally be impacted, but measurable or perceptible changes in plant community size, integrity, or continuity would not occur.

Minor: Adverse and beneficial impacts on native plants would be measurable or perceptible, but would be localized within a small area. For adverse impacts, the viability of the plant community would not be impacted and the community, if left alone, would recover.

Moderate: For adverse and beneficial impacts, a change would occur to the native plant community over a relatively large area that would be readily measurable in terms of abundance, distribution, quantity, or quality. Mitigation measures to offset/minimize adverse impacts would be necessary and would likely be successful.

Major: Adverse and beneficial impacts on native plant communities would be readily apparent and would substantially change vegetative community types over a large area, inside and outside the park. Extensive mitigation would be necessary to offset adverse impacts, and their success would not be ensured.

Duration: Short-term – Following implementation activities, impacts on vegetation would last less than three years.

Long-term – Following implementation activities, impacts on vegetation would last more than three years.

Wildlife and Habitat (Including Species of Concern)

Negligible: Terrestrial wildlife and their habitats would not be impacted, or the impacts would be at or below the level of detection and would not be measurable or of perceptible consequence to wildlife populations.

Minor: Adverse and beneficial impacts on wildlife or habitat would be measurable or perceptible, but localized within a small area. For adverse impacts, the mortality of an individual animal might occur but the viability of wildlife populations would not be impacted, and the community, if left alone, would recover.

Moderate: A change to terrestrial wildlife populations or habitat would occur over a relatively large area. The change would be readily measurable in terms of abundance, distribution, quantity, or quality of population. Mitigation measures would be necessary to offset adverse impacts, and they would likely be successful.

Major: Impacts on terrestrial wildlife populations or habitat would be readily apparent, and would substantially change wildlife populations over a large area in and out of the park. Extensive mitigation would be needed to offset adverse impacts, and the success of mitigation measures could not be ensured.

Duration: Short-term – Following implementation activities, impacts on wildlife and habitat would last less than one year.

Long-term – Following implementation activities, impacts on wildlife and habitat would last more than one year.

NPS Operations and Facilities

Long-term Management and Sustainability of Resources

Negligible: Park operations, long-term management, and sustainability of park resources would not be impacted, or the impact would be at or below the lower levels of detection.

Minor: Adverse and beneficial impacts would be detectable but would be of a magnitude that would not have an appreciable effect on park operations, long-term management, or sustainability of park resources.

Moderate: Adverse and beneficial impacts would be readily apparent and would result in a substantial change to park operations, long-term management, or sustainability of park resources in a manner noticeable to staff and the public.

Major: Adverse and beneficial impacts would be readily apparent and would result in a substantial change to park operations, long-term management, or sustainability of park resources in a manner noticeable to staff and the public, and would be markedly different from existing operations.

Duration: Short-term – Impacts would occur only during project implementation activities.

Long-term – Impacts would extend beyond project implementation activities.

APPENDIX H

FEBRUARY 7, 2005, LETTER FROM USDA-NRCS REGARDING PROPOSED LAND CONVERSION

ATTACHMENT 9

United States Department of Agriculture

NRCS
Natural Resources Conservation Service
2660 Sherman Avenue
Vicksburg, MS 39183

Post-it® Fax Note 7671	Date 06/27/08	# of pages ▶ 2
To Jonathan Bourdeau	From Liz Sargent	
Co./Dept. Mactec	Co. JMA	
Phone # 770/421-3361	Phone # 434/979-1617	
Fax # 770/421-3486	Fax # 434/979-3645	

February 7, 2005

To: Kurt Foote, Natural Resources Program Manager
Vicksburg National Military Park

Re: Proposed land Conversion

Per Vicksburg National Military Park's request, the Natural Resources Conservation Service (NRCS) has made soil loss calculations in the area on the park on the south loop that is being proposed for land conversion from trees to grass. During our prior meeting on site, park management indicated their concern for needing scientific documentation for soil loss that would occur on the area after being converted to grass compared to the current cover.

The NRCS soil loss prediction formula takes into consideration the following: soil type, slope percent, slope length, average rainfall, ground cover and conservation practices installed such as terraces and grade control structures. Basically, the only things that can be changed by man that will affect the soil loss predictions are ground cover and installed conservation practices.

Considering the current ground cover conditions on the site which includes: the average number of trees per acre, the average percent tree canopy cover and the average percent mulch cover, the estimated average annual soil loss currently occurring on this area is 1.5 tons per acre.

The following assumptions were made in predicting the soil loss rate after land conversion to grass on the same site.

1. Finished slopes graded to a minimum of 3:1 slopes.
2. 100 percent cover of bermuda grass established using the following fertilizer and seeding rates per acre:
   20 lbs. common bermuda grass seed
   600 lbs. 13-13-13 fertilizer
   2 tons agriculture lime
3. Erosion control blanket installed in the concentrated flow areas.
4. Mechanically mowed throughout summer growing season.
5. Overall highly managed to maintain 100% grass cover.

Considering these assumptions, the estimated average annual soil loss after land conversion would be .9 tons per acre.

ATTACHMENT 9

The Park Service management team indicated there is an interest within to consider incorporating various species of native grasses along with bermuda grass for the proposed cover. I have researched this idea with state and national level agronomist and have concluded that under the circumstances the park is dealing with, the native species will be extremely difficult to establish. Also, the erosion rates would be elevated significantly higher than with the current woodland cover. Therefore, I would strongly discourage attempting to establish native grasses other than bermuda on this site.

Please call if I can be of any further assistance concerning this matter.

Raymond Joyner, District Conservationist
USDA, Natural Resources Conservation Service