



4

Environmental Consequences

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most Obed^t Serv^t
G. Washington

Overleaf and This Page:

The alternatives would result in beneficial impacts to resources as different as Valley Creek and a letter from George Washington.

Chapter 4: Environmental Consequences

4.1 Introduction

Using a scientific and analytic basis for comparison, the following chapter describes the probable consequences of each proposed alternative on the cultural, physical, and natural resources; visitor use and experience; socioeconomic environment; transportation and site access; and park operations within Valley Forge NHP. To enable cross-referencing, the individual impact topics appear in the order in which they were discussed in Chapter 3: Affected Environment.

The alternatives presented in this Draft GMP/EIS for Valley Forge NHP establish management objectives and propose potential actions that may occur as a result of those objectives. The general nature of the management objectives and potential actions dictates that the analysis of impacts also be general. Where possible, specific impacts have been identified; however, the majority of this analysis is programmatic in nature and further environmental compliance (including both NEPA and Section 106 of the NHPA) may be required as actions are implemented. Appendix F provides a list of the NEPA and Section 106 requirements for potential actions associated with the NPS Preferred Alternative (Alternative C), and Appendix G includes a Draft Programmatic Agreement for compliance with Section 106 of the NHPA.

4.2 Methodology for Assessing Impacts

As required by the National Environmental Policy Act of 1969, as amended, potential impacts are described in terms of type (beneficial or adverse, direct or indirect), context (site-specific, local, or regional), duration (short-term or long-term), and level of intensity (negligible, minor, moderate, or major). Cumulative impacts are also assessed. Overall, the NPS based these impact analyses and conclusions on the review of existing literature and Valley Forge NHP studies, information provided by subject matter experts within the park and other agencies, professional judgments, and park staff insights. The following general definitions are used throughout the impact analysis.

4.2.1 Type of Impact

“Type of impact” is the effect that an action has on a resource.

- **Beneficial:** A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.
- **Adverse:** A change that moves the resource away from a desired condition or detracts from its appearance or condition.
- **Direct:** An impact that is caused by an action and occurs at the same time and place.
- **Indirect:** An impact that is caused by an action but is later in time or farther removed in distance, but still reasonably foreseeable.

4.2.2 Context

“Context” is the setting within which an impact is analyzed.

- **Site-specific:** The impact would affect the project site.
- **Local:** The impact would affect the park.
- **Regional:** The impact would affect localities surrounding the park.

4.2.3 Duration of Impact

For most resources and values, the “duration of impact” in this document is defined as follows

- **Short-term:** Impacts that occur only during construction or last less than one year.
- **Long-term:** Impacts that last longer than one year.

Where necessary, duration is redefined for specific impact topics within the individual methodology sections.

4.2.4 Level of Intensity

“Level of intensity” is measured by severity and magnitude of impact, i.e., negligible, minor, moderate, or major. Because the level of intensity varies by impact topic, intensity threshold definitions are provided separately for each impact topic.

4.2.5 Cumulative Impacts

In addition to direct and indirect impacts, the CEQ regulations that implement NEPA also require assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as the impact on the environment which results from an action when added to other present and reasonably foreseeable actions, regardless of what agency or person undertakes the action (40 CFR 1508.7).

The following projects were determined to be potential contributors to cumulative impacts on the affected resources in conjunction with the potential impacts of the GMP alternatives.

River Crossing Complex Projects (RCC)

The sponsors of the VFATPS entered into a December 2002 Programmatic Agreement (Appendix A) to implement that study’s recommendations. It noted that park traffic issues and remedy options should be addressed in this GMP/EIS, while problems related to US 422 and its interchange operations should be addressed with advancement of three independent projects that comprise the RCC in the vicinity of the US 422 crossing of the Schuylkill River, along the eastern edge of the park. The transportation Programmatic Agreement outlines the actions that will be carried out in this next phase of project development (with PennDOT and FHWA as lead agencies) and identifies the elements of the RCC as follows

- the Betzwood Bridge replacement project
- US 422/PA Route 23 interchange with the North Gulph Road relocation (SR0422 SEC 2NG)
- US 422/PA Route 363 interchange with US 422 widening from Trooper Road to US 202 (SR0422 SEC 4TR)

The Betzwood Bridge replacement project is in the final design stage, with construction expected in 2007. Preliminary engineering and environmental review for the two interchange projects have been funded and are now underway. Initial funding for construction has been earmarked.

Work in the interchanges includes environmental clearance documents for SR0422 Sections 2NG and 4TR, as well as the traffic analysis and preparation of a point of access study for the US 422/PA Route 23 and the US 422/PA Route 363 interchanges to ensure that traffic operations of the National Highway System route are not adversely affected by a change in access to/from that facility. This information will help assess the cumulative effects on the park and other resources in the Valley Forge area.

The RCC projects have the potential to impact cultural landscapes, topography and geologic resources, soils, surface waters and groundwater, floodplains, wetlands, vegetation, wildlife, air quality, soundscapes, lightscapes, visitor use and experience, socioeconomic environment, transportation and site access, and park operations and facilities.

Schuylkill Valley Metro Transit Improvement

The Schuylkill Valley Metro public transportation project is proposed for the Schuylkill Valley Corridor, extending approximately 62 miles between Reading and Philadelphia. It is a joint project sponsored by the Berks Area Reading Transportation Authority and SEPTA. The region within the corridor is one of the fastest growing areas in southeastern Pennsylvania. Its two principal highways, the Schuylkill Expressway (I-76) and the US 422 Expressway, as well as many arterial and secondary roads, are plagued by congestion. With the tremendous growth of jobs and population taking place in the corridor, land development is occurring rapidly, with commensurate loss of farmland and open space. Meanwhile, many of the older, former industrial towns in the corridor need economic development. Existing public transportation consists of limited bus service, concentrated primarily toward the Reading and Philadelphia ends of the corridor and a commuter rail service between Philadelphia and Norristown and Philadelphia and Paoli that does not directly serve the newer centers of growth in the corridor.

This project could potentially impact the following resources: air quality, soundscapes, visitor use and experience, socioeconomic environment, transportation and site access, and park operations and facilities.

Improvements to PA Route 23 in Upper Merion Township

Improving the PA Route 23 corridor in Upper Merion Township has been a long-standing transportation objective for the township. The purpose is to improve access to river crossings; improve safety and LOS; minimize traffic impacts through residential neighborhoods on PA Route 23 and adjacent streets; support local and regional planning and economic development objectives; and integrate/improve

access to non-vehicular modes of transportation, including the proposed SVM, bus and transit services, and pedestrian and bicycle networks.

The project study area is 12,100 acres in size and focuses on existing PA Route 23 between US 422 in the west and US 202 in the east. In order to consider a reasonable range of project alternatives, the study area includes roadways generally parallel to PA Route 23, such as US 202 and south to Trooper Road/Egypt Road/Main Street. The study area also includes Valley Forge NHP to assess the possible impacts and benefits of the project on the park. Concurrence on project need for the improvements to PA Route 23 in Upper Merion Township was obtained during an agency coordination meeting in late 2002.

The alternatives considered in the preliminary alternatives document for this project included: no-action, TSM, mass transit, improvements to the west end of PA Route 23, widen existing PA Route 23, and relocate PA Route 23 on new alignment and widen Trooper Road/Egypt Road/Main Street.

This project could potentially impact the following resources: topography and geologic resources, soils, surface waters and groundwater, vegetation, air quality, soundscapes, visitor use and experience, and transportation and site access.

PA Turnpike Widening and Interchange

The section of the PA Turnpike between mileposts 326 (Valley Forge) and 333 (Norristown) was originally built in the 1950s. Reconstruction of this portion of the highway began in 1998 with the \$35.6 million Schuylkill River Bridge Project that resulted in a new six-lane bridge. Funding is now available to complete the reconstruction (including widening of the turnpike to six lanes) of the area between the Valley Forge and Norristown interchanges. The work would be done in stages that would impact motorists and the turnpike's neighbors in different ways. The Turnpike Commission also is soliciting requests for proposals for the design, construction, financing, operation, management, and maintenance of the 21 service plazas along the turnpike, including the one at Valley Forge.

The PA Route 29 "slip ramp" exit is a new PA Turnpike interchange planned for construction in Chester County. Located midway between the Downingtown exit (312) and the Valley Forge exit, the new facility would serve burgeoning corporate centers and business parks along the PA Route 29 corridor – especially in the Greater Valley Forge area. It would shorten travel times for thousands of commuters and help ease traffic congestion at neighboring interchanges and on local roads. This slip ramp, an unstaffed interchange built exclusively for use by E-Z Pass members, will cost approximately \$35 million.

This project could potentially impact the following resources: cultural landscapes, historic structures, archeological resources, surface waters and groundwater, floodplains, vegetation, wildlife, air quality, soundscapes, lightsapes, visitor use and experience, socioeconomic environment, transportation and site access, and park operations and facilities.

Asbestos Release Site

In January 1997, during the installation of a fiber optic cable in the Amphitheater Quarry of Valley Forge NHP, park staff discovered a suspicious substance in the soil later confirmed to contain asbestos. At the request of the NPS, the EPA initiated an

emergency response action between May and October 1997 to abate the immediate risks to public health, welfare, and the environment posed by contaminated soils. The impacted area is referred to as the Valley Forge ARS. The site is currently being investigated so that a long-term remedy can be implemented.

The GMP/EIS process and the ARS investigation and clean up process are separate but related. This GMP/EIS identifies alternative desired futures for the management of cultural and natural resources and visitor use throughout the park, including park areas within the site. Consistent with CERCLA and the National Contingency Plan, a separate public process is evaluating a suite of alternatives for cleaning up the site and returning the contaminated areas to safe and beneficial public use.

This project could potentially impact the following resources: historic structures, topography and geologic resources, soils, vegetation, wildlife, visitor use and experience, socioeconomic environment, and park operations and facilities.

Valley Creek Integrated Stormwater Management Plan

The Chester County Water Resources Authority is leading an initiative to develop an Integrated Stormwater Management Plan for the approximately 23 square miles of the East Valley Creek watershed, of which about 1 square mile is in Valley Forge NHP. The county's plan identified this watershed as its top priority for water quality restoration due to the creek's state designation as an Exceptional Value stream with a population of naturally reproducing trout. Approximately 32% of the stream miles are not meeting their targets due to runoff from developed lands. The stream is also subject to frequent and severe flash flooding.

The plan will include both a Pennsylvania Act 167 stormwater management study for a watershed-wide approach to preservation and restoration, and also a natural stream assessment (fluvial geomorphology study) to identify how well various stream reaches are functioning. The final plan will provide a model stormwater management ordinance for adoption by each municipality in the watershed, as well as recommendations for stormwater management and watershed restoration. Future implementation of the plan will directly affect that portion of the creek that is within the park because it lies at the bottom of the watershed.

This project could potentially impact the following resources: cultural landscapes, historic structures, archeological resources, topography and geologic resources, soils, surface waters and groundwater, floodplains, wetlands, vegetation, wildlife, visitor use and experience, and socioeconomic environment.

Valley Creek Restoration Plan

Following the discovery of major PCB contamination of Valley Creek, the Valley Creek Trustee Council was formed to develop a plan for recovery of the creek's natural and recreational values. The council, comprising Valley Forge NHP and the PA Fish & Boat Commission, was authorized under the federal Superfund law to manage the resources of Valley Creek damaged by PCB discharges. In 2004, after a public process, the council issued a Restoration Plan and Environmental Assessment for Valley Creek.

The plan calls for projects to infiltrate stormwater, stabilize stream channels, maintain greenways along the creeks in the watershed, increase access by anglers and other users of the watershed, and restore a population of brook trout in Crabby

Creek. Grant money is available for projects in the watershed that meet these goals. To implement stormwater management actions in the plan, the Valley Creek Restoration Partnership formed, comprising environmental groups with active advisory participation from the park; federal, state, and local government; and universities. Successful implementation will dramatically lessen the severe impacts of flash flooding along Valley Creek in the park.

This project could potentially impact the following resources: cultural landscapes, historic structures, archeological resources, topography and geologic resources, soils, surface waters and groundwater, floodplains, wetlands, vegetation, wildlife, visitor use and experience, and socioeconomic environment.

Methodology

In defining the contribution of each alternative to cumulative impacts, the following terminology is used.

Imperceptible: The incremental effect contributed by the alternative to the overall cumulative impact is such a small increment that it is impossible or extremely difficult to discern.

Noticeable: The incremental effect contributed by the alternative, while evident and observable, is still relatively small in proportion to the overall cumulative impact.

Appreciable: The incremental effect contributed by the alternative constitutes a large portion of the overall cumulative impact.

Because some of the actions described above are in the early planning stages, the evaluation of the cumulative impact is based on a general description of the project. The cumulative impact is considered for all alternatives and is presented at the end of each impact topic discussion.

4.2.6 Impairment

In addition to determining the environmental consequences of the preferred and other alternatives, *NPS Management Policies 2006* (NPS 2006) and DO #12 require analysis of impacts to determine whether actions have the potential for impairment of park resources and values.

A fundamental purpose of the NPS, as provided for in its Organic Act (1916) and reaffirmed by the General Authorities Act, as amended in 1978, is a mandate to conserve park resources and values. The laws give the NPS management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of the park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the NPS management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirements that the NPS must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including opportunities that would otherwise be present for the enjoyment of those resources and values. An impact would be more likely to constitute impairment to the extent that it affects a resource or value whose conservation is

1. Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
2. Key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or
3. Identified in the park's general management plan or other relevant NPS planning documents as being of significance.

Impairment may result from NPS activities in managing the park, as well as visitor activities or activities undertaken by concessionaires, contractors, and others operating in the park.

Impairment also may result from an inherited or pre-existing condition of park resources and values that subsequently have been determined by the park as significant. At Valley Forge NHP, the cultural landscape is impaired by the 19th century quarries and the maintenance complex located in the center of the Grand Parade. (See Section 3.3.1 for a description of the cultural landscape.) These conditions existed prior to the formation of the national park but were nonexistent during the primary period of significance. Since that time, the conditions have transformed the site of the encampment. These intrusions limit the park's ability to fulfill the purpose and significance of Valley Forge NHP, as determined by the establishing legislation. The quarries mar an essential cultural landscape at the heart of the park, thus minimizing visitor understanding of the encampment.

Impairment of park resources and values also may develop due to a lack of management or action in response to a condition beyond park control. Due to years of heavy deer browse, the vegetation and wildlife at Valley Forge NHP have been severely impacted and may become impaired if actions are left unchanged. These resources have been identified by this Draft GMP/EIS as being of significance. The natural abundances, diversities, dynamics, and distributions of native plants and animals are key to a healthy ecological system and important to supporting the park's mission. Monitoring and research have shown a direct link between the deer population and the lack of forest structure, absence of native species, and spread of invasive plants. A subsequent deer management plan will analyze these actions to determine whether an impairment of vegetation and wildlife will result.

An impairment determination for all impact topics is provided in the Conclusion section under each impact topic, with the exception of visitor use and experience, socioeconomic environment, transportation and site access, and park operations and facilities, for which no impairment determination is required.

4.3 Impacts to Cultural Resources

4.3.1 Impacts to Cultural Landscapes

Regulations and Guidelines Related to Cultural Landscapes

- ACHP implementing regulations regarding the “Protection of Historic Properties” (36 CFR 800)
- Antiquities Act of 1906
- NHPA of 1966, as amended
- Executive Order 11593, “Protection and Enhancement of Cultural Environment”
- DO #28, “Cultural Resources Management Guidelines”

Methodology

Cultural landscapes are the result of the long interaction between people and the land, and the influence of human beliefs and actions over time upon the natural landscape. Shaped through time by land use and management practices, as well as politics and property laws, levels of technology, and economic conditions, cultural landscapes provide a living record of an area’s past, as well as a visual chronicle of its history. The dynamic nature of modern human life, however, contributes to the continual reshaping of cultural landscapes; making them a good source of information about specific times and places, but at the same time rendering their long-term preservation a challenge.

In order for a cultural landscape to be listed on the National Register, it must possess significance (the meaning or value ascribed to the landscape) and have integrity of those features necessary to convey its significance. The character-defining features of a cultural landscape include spatial organization and land patterns, topography, vegetation, circulation patterns, water features, structures/buildings, site furnishings, and objects. The Cultural Landscape Report completed for the park in 2002. Its delineation of significant and contributing features is the basis for the analysis of impacts in this section.

For purposes of analyzing potential impacts to cultural landscapes, the thresholds of change for the intensity of an impact are defined below.

Negligible: Impact(s) is at the lowest levels of detection with neither adverse nor beneficial consequences.

Minor: Adverse Impact – Alteration of a pattern(s) or feature(s) of the landscape would not diminish the overall integrity of the landscape.

Beneficial Impact – Preservation of landscape pattern(s) or feature(s) in accordance with the *Secretary of the Interior’s Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*.

Moderate: Adverse Impact – Alteration of a pattern(s) or feature(s) of the landscape would diminish the integrity of character-defining pattern(s) or feature(s) of the cultural landscape but would not diminish the integrity of the landscape to the extent that its National Register eligibility is jeopardized.

Beneficial Impact – Rehabilitation of a landscape or its pattern(s) or feature(s) in accordance with the *Secretary of the Interior’s Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*.

Major: Adverse Impact – Alteration of a pattern(s) or feature(s) of the landscape would diminish the overall integrity of the landscape to the extent that it is no longer eligible to be listed on the National Register.

Beneficial Impact – Restoration of a landscape or its pattern(s) or feature(s) in accordance with the *Secretary of the Interior’s Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*.

Impacts of Alternative A: No-Action

Under Alternative A, management of cultural and natural resources, visitor use patterns, transportation options, and park operations would remain essentially unchanged. The cultural landscape would be preserved as is and would largely reflect the state-park commemorative period on the south side, and a modern agricultural and old-field landscape on the north side.

Impacts Related to Cultural Resource Management Actions

Park-wide, the cultural landscape would be maintained as is. Preservation of the existing relative pattern of forest and meadow/open field, as well as replacement in kind of existing commemorative plantings as needed, would have a long-term, minor, beneficial impact on cultural landscapes. Lack of management of Fuller Field and the Waggonseller Field (south of US 422) and their resulting return to forest would have a long-term, negligible, adverse impact. Preservation of existing cluster patterns would have a long-term, minor, beneficial impact.

Preservation of existing National Register-contributing elements such as hedgerows and commemorative features would have a long-term, minor, beneficial impact. Continued cooperation with neighboring townships and transportation departments to screen modern visual intrusions beyond the boundary would have long-term, minor, beneficial impacts.

Impacts Related to Natural Resource Management Actions

In this alternative, natural resources would continue to be minimally managed, and no changes would be made that would directly affect the overall patterns of the cultural landscape. Continued participation in local and regional initiatives to manage storm water would have long-term, minor, beneficial impacts on the integrity of the stream valleys.

Failure to manage the size of the white-tailed deer herd could lead to the ultimate loss of the forests because the trees are no longer able to regenerate. This would have a long-term, major, adverse impact on the cultural landscape.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Because visitor use patterns would remain unchanged, there would be no resulting impacts to the cultural landscape. No alternative transportation options would be provided, and because there would continue to be high levels of through-traffic on public roads and visitor traffic on park tour roads, there would continue to be long-term, moderate, adverse impacts to this setting that was designed for pedestrians and horse-drawn carriages.

Impacts Related to Park Operations Actions

Park operations would remain unchanged, and staffing levels could continue to decrease in line with the declining federal budget. As staffing and budgets declined, it could become increasingly difficult to maintain the commemorative landscape, including specimen and champion trees, ornamental groves, memorial allées of trees, and other features, potentially leading to a loss of integrity of the cultural landscape. This would result in a long-term, moderate, adverse impact.

Both the 19th century quarries and the maintenance complex were present at the center of the Grand Parade prior to establishment of the national historical park.

Because they would remain under this alternative, there would continue to be a long-term, major, adverse impact to this key historic space.

Cumulative Impact

Several present and reasonably foreseeable future actions would contribute to the cumulative impact on the cultural landscapes at Valley Forge NHP, including the RCC projects, the PA Turnpike widening and new interchange, and implementation of the Valley Creek Restoration and Stormwater Management Plans.

The RCC comprises three separate projects

- The replacement of the Betzwood Bridge, as described in the draft Section 4(f) documentation of July 8, 1997, would pose a long-term, minor, adverse impact to the park's cultural landscape due to the increase in height and breadth of the bridge and its approaches as compared to the 19th century bridge it replaces.
- Widening of US 422 would take place in the median strip of the existing highway and would pose no impacts to the park's cultural landscape. The reconfiguration of the US 422/PA Route 363 interchange would take place within existing highway right-of-way and would pose no impact to the park's cultural landscape.
- The reconfiguration of the US 422/PA Route 23 interchange would pose no impact to the park's cultural landscape. The relocation of PA Route 23 would establish a new alignment adjacent to US 422 in an area previously greatly altered. Existing PA Route 23 (North Gulph Road) in this area would be abandoned by PennDOT.

The widening of the PA Turnpike would take place beyond the park boundary and would eliminate much of the existing vegetative tree screen. Without replacement of the screen, there would be continuing long-term, moderate, adverse impacts to the park's cultural landscape both from additional traffic and also the lights and commercial signage already visible from the rest stop.

Preliminary alternatives for remediation of asbestos within the park propose excavation of "hot spots" and/or application of fill to those areas. In every case, this work would take place in areas already greatly altered by 19th century quarrying and 19th and 20th century manufacturing. Such remediation would pose no impact to the park's cultural landscape.

Implementation of the Valley Creek Restoration Plan and the Valley Creek Stormwater Management Plan in the watershed upstream of the park would help to preserve the current stream alignment as well as resources such as Washington's Headquarters and the covered bridge, and would have long-term, moderate, beneficial impacts to cultural landscape along Valley Creek.

These projects, along with the impacts of Alternative A, would result in a long-term, major, adverse cumulative impact on the cultural landscape. Alternative A would contribute a noticeable, adverse increment to the overall cumulative impact.

Impacts of Alternative B

Under Alternative B, the cultural landscape would be preserved as is and respected as a memorial landscape that has been commemorated in many ways over generations, each leaving significant patterns.

Impacts Related to Cultural Resource Management Actions

Under Alternative B, the cultural landscape would be preserved as is park-wide. Preservation of the existing relative pattern of forest and meadow/open field, as well as replacement in kind of existing commemorative plantings as needed, would have a long-term, minor, beneficial impact. Reforestation of Fuller Field and the Waggonseller Field (south of US 422) would have a negligible impact. Preservation of existing circulation patterns and existing cluster patterns would have a long-term, minor, beneficial impact.

Preservation of existing National Register-contributing elements such as hedgerows and commemorative features would have long-term, minor, beneficial impacts. Continued cooperation with neighboring townships and transportation departments to screen modern intrusions beyond the boundary would have long-term, minor, beneficial impacts.

Impacts Related to Natural Resource Management Actions

As is the case for Alternative A, under Alternative B no changes would be made that would directly affect the overall vegetative patterns of the cultural landscape. Continued participation in local and regional initiatives to manage stormwater would have long-term, minor, beneficial impacts on the integrity of the stream valleys.

The development and implementation of a vegetation management plan that would identify measures to control exotic invasive plants and a deer management plan that would control the size of the white-tailed deer herd would have a long-term, major, beneficial impact due to the resulting ability to save the forests and commemorative plantings.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Clear explanations and demonstrations of the history of the landscape and its layers would lead to its understanding and appreciation by visitors, which could lead to better support and stewardship, resulting in a beneficial impact.

Better management of park trails, and particularly the elimination of miles of personal trails illegally established by visitors, would have a long-term, minor, beneficial impact.

The proposed pedestrian bridge across the Schuylkill River would be visible to boaters on the river and to people using the River Trail on the north side. The bridge would pose a long-term, minor, adverse impact to the cultural landscape.

No alternative transportation options would be provided, and because there would continue to be high levels of through-traffic on public roads and visitor traffic on park tour roads, there would continue to be long-term, moderate, adverse impacts to this setting that was designed for pedestrians and horse-drawn carriages. Removal of parking lots and restoration of the historic contours of these areas would have long-term, moderate, beneficial impacts.

Impacts Related to Park Operations Actions

The leasing or visitor-services concessions use of some park buildings could cause impacts to cultural landscapes immediately adjacent to the buildings, through the addition of driveways, walks, construction of underground utility lines or septic fields, and/or parking. In cases in which the landscapes contribute to the National Register significance of the park, new uses would be limited to those which would pose no greater than long-term, moderate, adverse impacts to the adjacent cultural landscapes.

Because the maintenance complex and the 19th century quarries would remain at the center of the Grand Parade, there would continue to be a long-term, major, adverse impact to this key historic space.

Cumulative Impact

Present and reasonably foreseeable future actions that would contribute to the cumulative impact to cultural landscapes at Valley Forge NHP are described above under Cumulative Impact for Alternative A. These projects, along with the impacts of Alternative B, would result in a long-term, major, adverse cumulative impact on the cultural landscape. Alternative B would contribute a noticeable, adverse increment to the overall cumulative impact.

Impacts of Alternative C: NPS-Preferred

Under Alternative C, two key interpretive zones would be rehabilitated to their 18th century conditions. The remainder of the park's cultural landscape would be preserved as is.

Impacts Related to Cultural Resource Management Actions

The rehabilitation of two key interpretive areas to evoke their 18th century conditions (Muhlenberg's Brigade area and part of the Grand Parade) would have long-term, moderate, beneficial impacts. The removal of the maintenance complex and County Line Road from the center of the Grand Parade and refilling of the quarries to their historic contours would have long-term, major, beneficial impacts.

The closing and rehabilitation of Gulph Road to a historic trace road would have long-term, moderate, beneficial impacts. Restoration of some historic vistas also would have long-term, moderate, beneficial impacts. Preservation of the remainder of the cultural landscape, including small-scale contributing elements, would have long-term, minor, beneficial impacts.

Preservation of the existing relative pattern of forest and meadow/open field, as well as replacement in kind of existing commemorative plantings as needed, would have long-term, minor, beneficial impacts. Reforesting Fuller and Waggoner Fields (south of US 422) would have a negligible impact. Continued cooperation with neighboring townships and transportation departments to screen modern intrusions beyond the park boundary would have long-term, minor, beneficial impacts.

Impacts Related to Natural Resource Management Actions

Few changes would be made that would directly affect the overall vegetative patterns of the cultural landscape. Continued participation in local and regional initiatives to manage stormwater would have long-term, minor, beneficial impacts on the integrity of the stream valleys.

The development and implementation of a vegetation management plan that would identify measures to control exotic invasive plants and a deer management plan that would control the size of the white-tailed deer herd would have a long-term, major, beneficial impact due to the resulting ability to save the forests and commemorative plantings.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Removal of parking lots from the cultural landscape and restoration of the historic contours of these areas would have long-term, moderate, beneficial impacts.

Better management of park trails, and particularly the elimination of miles of personal trails illegally established by visitors, would have a long-term, minor, beneficial impact.

The proposed pedestrian bridge across the Schuylkill River would be visible to boaters on the river and to people using the River Trail on the north side. The bridge would pose a long-term, minor, adverse impact to the cultural landscape.

Because alternative transportation options would be provided and most personal vehicles would not circulate through the park, there would be long-term, major, beneficial impacts to this setting that was designed for pedestrians and the pace of horse-drawn carriages.

Impacts Related to Park Operations Actions

The leasing or visitor-services concessions use of some park buildings could cause impacts to cultural landscapes immediately adjacent to the buildings, through the addition of driveways and walks, construction of underground utility lines or septic fields, and/or parking. In cases in which the landscapes contribute to the National Register significance of the park, new uses would be limited to those which would pose no greater than long-term, moderate, adverse impacts to the cultural landscapes.

Because the maintenance complex and the 19th century quarries would be removed from the center of the Grand Parade and the area restored to its historic contours, there would be a long-term, major, beneficial impact to this key historic space.

Cumulative Impact

Present and reasonably foreseeable future actions that would contribute to the cumulative impact to cultural landscapes at Valley Forge NHP are described above under the Cumulative Impact for Alternative A. These projects, along with the impacts of Alternative C, would result in a long-term, major, beneficial cumulative impact on the cultural landscape. Alternative C would contribute an appreciable, beneficial increment to the overall cumulative impact.

Conclusion

Depending on the alternative, the overall impact to cultural landscapes would range from minor to major and include both long-term, beneficial and long-term, adverse impacts. Overall, Alternative A would have a long-term, minor, and beneficial impact on the cultural landscape, as well as a long-term, major, adverse impact. Alternative A would contribute a noticeable, adverse increment to the long-term, major, and adverse cumulative impact. Overall, Alternative B would include both a long-term, minor to major, beneficial impact and a long-term, major, adverse impact on the cultural landscape. As with Alternative A, Alternative B would contribute a noticeable, adverse increment to the long-term, major, and adverse cumulative impact.

The overall impact of Alternative C on the cultural landscape would be long-term, minor to major, and beneficial. It would contribute an appreciable, beneficial increment to the long-term, major, beneficial cumulative impact.

Because both Alternatives A and B would result in a major adverse impact to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified in relevant NPS planning documents as being of significance, there would be an impairment of park resources or values related to cultural landscapes. As described in Section 4.2.6: Impairment, this impairment determination stems from the continued presence of the quarries and the maintenance complex within the Grand Parade. Both conditions existed prior to the establishment of Valley Forge NHP. These intrusions limit the park's ability to fulfill the purpose and significance of the park, as determined by the establishing legislation. The quarries mar an essential cultural landscape at the heart of the park, thus minimizing visitor understanding of the encampment.

Alternative C would not result in a major adverse impact to cultural landscapes; therefore, there would be no impairment to the cultural landscape as a result of implementing Alternative C.

4.3.2 Impacts to Historic Buildings and Structures

Methodology

In order for a structure or building to be listed on the National Register, it must be associated with an important historic context, i.e., possess significance – the meaning or value ascribed to the structure or building, and have integrity of those features necessary to convey its significance, i.e. location, design, setting, workmanship, materials, feeling, and association. An updated draft National Register Nomination for the park is on review by the Pennsylvania SHPO as of this writing. Its delineations of significant and contributing features are the basis for the analysis of impacts in this section.

For purposes of analyzing potential impacts to historic buildings and structures, the thresholds of change for the intensity of an impact are defined as follows.

Negligible: Impact(s) is at the lowest levels of detection with neither adverse nor beneficial consequences.

Minor: Adverse Impact – Alteration of a character-defining feature(s) would not diminish the overall integrity of the resource.

Beneficial Impact – Stabilization/preservation of character-defining feature(s) in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*.

Moderate: Adverse Impact – Alteration of a character-defining feature(s) of the structure or building that would not diminish the integrity of the resource to the extent that its National Register eligibility is jeopardized.

Beneficial Impact – Rehabilitation of a structure or building in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*.

Regulations and Guidelines Related to Historic Structures

- ACHP implementing regulations regarding the "Protection of Historic Properties" (36 CFR 800)
 - Antiquities Act of 1906
 - Historic Sites, Buildings, and Antiquities Act of 1935, as amended
 - NHPA of 1966, as amended
 - *Secretary of the Interior Standards for Treatment of Historic Properties* (1996)
 - Executive Order 11593, "Protection and Enhancement of Cultural Environment"
 - DO #28, "Cultural Resources Management Guidelines"
-

Major: Adverse Impact – Alteration of a character-defining feature(s) of the structure or building that diminishes the integrity of the resource to the extent that it is no longer eligible to be listed on the National Register.

Beneficial Impact – Restoration of a structure or building in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*.

Impacts of Alternative A: No-Action

Impacts Related to Cultural Resource Management Actions

Park-wide, historic buildings and structures would be preserved as they currently are and current uses would continue. Continued inappropriate use and possible diminution of staff and budget to maintain buildings could result in long-term, adverse impacts. Deferred maintenance could lead to long-term, minor to moderate, adverse impacts.

The Boulware portion of the Pawling Mansion would receive no stabilization and could be expected to collapse, resulting in a long-term, major, adverse impact.

Some post-encampment-period buildings listed on the National Register would be demolished, posing a long-term, major, adverse impact. Prior to demolition of several 19th century houses and outbuildings in the Village of Port Kennedy and the Village of Valley Forge, some outbuildings at the Philander Knox estate, and the 20th century Laughlin and Wilson houses, the NPS would consult with the ACHP and the Pennsylvania SHPO to develop appropriate mitigation activities. (See Appendix D for a complete list of proposed building treatments.)

Under Alternative A, the park's 40 monuments would be preserved as is. There would continue to be a minor, adverse impact due to lack of adequate staff and funding to care for the monuments on a regular and proactive basis.

Remaining encampment-period earthworks within the forests would continue to be at risk, as large trees growing on them die and topple, uprooting substantial portions. There could be a long-term, moderate, adverse impact on these earthworks.

Impacts Related to Natural Resource Management Actions

In this alternative, natural resources would continue to be minimally managed, and no changes would be made that would directly or indirectly affect historic buildings and structures. Therefore, there would be no impacts.

Impacts Related to Public Use, Enjoyment, and Experience Actions

There would be no impacts to buildings or monuments due to public use, enjoyment, and experience actions. Earthworks would continue to be endangered by erosion due to trampling and off-trail visitor use, resulting in long-term, minor to moderate, adverse impacts.

Impacts Related to Park Operations Actions

The NPS would continue to use four historic structures as park offices: the Mordecai Moore House, Maurice Stephens House, Philander Knox House, and the Thomas House. Others could be used for this purpose in the future. Office use of these buildings requires incremental changes to the interiors and exteriors to fit them for modern office wiring, loading, parking, and other requirements of this use. These create potential long-term, minor to moderate, adverse impacts on these buildings and on the cultural landscape surrounding them.

The NPS would continue to use some 30 historic buildings for housing park employees. (See Appendix D for a list of buildings used as housing.) In every case, loss of historic fabric already has occurred, and no additional impact is anticipated.

Cumulative Impact

Several present and reasonably foreseeable future actions would contribute to the cumulative impact on historic buildings and structures at Valley Forge NHP, including the widening of the PA Turnpike, remediation of asbestos within the park, and the Valley Creek Stormwater Management and Restoration Plans.

The widening of the PA Turnpike would take place adjacent to the park boundary. Widening to within 100 feet of Lafayette's Quarters could pose a long-term, moderate, adverse impact, depending on how construction was managed.

Preliminary alternatives for remediation of asbestos within the park propose excavation of "hot spots" and/or application of fill to those areas. In every case, this work would take place in areas already greatly altered by 19th century quarrying and 19th and 20th century manufacturing. Such remediation could pose long-term, minor, adverse impacts to some contributing structures associated with 19th century manufacturing.

Implementation of the Valley Creek Restoration Plan and the Valley Creek Stormwater Management Plan in the watershed upstream of the park would help to preserve resources such as Washington's Headquarters and the covered bridge. These plans would have long-term, moderate, beneficial impacts to historic structures along Valley Creek.

These projects, along with the impacts of Alternative A, would result in both a long-term, major, adverse cumulative impact and a long-term, moderate, beneficial cumulative impact to the park's historic buildings and structures. Alternative A would contribute a noticeable, adverse increment to the cumulative impact.

Impacts of Alternative B

Impacts Related to Cultural Resource Management Actions

Most encampment-period buildings would be preserved as is, in accordance with the *Secretary of the Interior's Standards for Historic Preservation*, resulting in long-term, minor, beneficial impacts. In addition, stabilization and preservation of the Walnut Hill Barn, Pawling Mansion, and the Springhouse ruins would have a long-term, minor, beneficial impact. Rehabilitation of Stirling's Quarters, Knox' Quarters, Lafayette's Quarters, the Mordecai Moore House, and the Steuben Memorial Center would result in a long-term, moderate, beneficial impact.

Most post-encampment-period buildings that contribute to the National Register significance of the park would be preserved as is, in accordance with the *Secretary of the Interior's Standards for Historic Preservation*, resulting in long-term, minor, beneficial impacts. In addition, some would be rehabilitated, including the Maurice Stephens House, the Philander Knox House and outbuildings, the three Horseshoe Trail houses, some buildings in the Village of Valley Forge, and others posing a long-term, moderate, beneficial impact.

Some post-encampment-period buildings listed on the National Register would be demolished, posing a long-term, major, adverse impact. Prior to demolition of the

19th century Haney House and Garage, Nichols House and Garage, Robert McCurdy House and Garage, Philander Knox Bath House and greenhouse superstructure, and Boyer Garage; and the 20th century Rose House and Wilson House, the NPS would consult with the ACHP and the Pennsylvania SHPO to develop appropriate mitigation activities. (See Appendix D for a complete list of proposed building treatments.)

The park's 40 monuments would be preserved in accordance with the *Secretary of the Interior's Standards for Historic Preservation*, resulting in long-term, moderate, beneficial impacts.

Encampment-period earthworks would be preserved by being cleared of large trees, resulting in long-term, minor, beneficial impacts.

Impacts Related to Natural Resource Management Actions

There would be no impacts on historic buildings, monuments, or earthworks due to natural resource management actions.

Impacts Related to Public Use, Enjoyment, and Experience Actions

The leasing or visitor-services concessions use of some historic buildings would result in prevention of continuing deterioration and would place the buildings in good condition. Preparation of buildings for leasing could cause both beneficial and adverse impacts to them. Depending on the proposed use, the exteriors of buildings that contribute to the National Register significance of the park would be preserved, rehabilitated, or restored, resulting in long-term, minor to major, beneficial impacts. The interiors of buildings also would be preserved, rehabilitated, or restored, resulting in long-term, minor to major, beneficial impacts. Some modifications to historic interiors could be required, including installation of heating, cooling, and fire suppression systems; modern plumbing; alterations to walls and locations of doors; addition of accommodations for accessibility; and/or additions of second means of egress. In cases in which the buildings contribute to the National Register significance of the park, new uses would be limited to those which would require changes that pose no greater than long-term, moderate, adverse impacts to the buildings. Any potential impacts to historic fabric would be identified through survey, and appropriate planning would mitigate and minimize loss of historic fabric. All work would follow the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Rehabilitating Historic Buildings*, NPS management policies, and Director's Order #28, "Cultural Resources Management Guidelines." Treatment plans developed in consultation with the Pennsylvania SHPO would ensure that park staff makes good decisions regarding the preservation of remaining features and the rehabilitation of others. The number of buildings that would be leased or used for visitor-services concessions is not yet known.

The greater availability and use of partnership and donated funds to enable the preservation and/or rehabilitation of historic buildings for public programming would have long-term, moderate, beneficial impacts.

There would be no impacts on monuments due to public use, enjoyment, and experience actions.

Closure and/or relocation of trails away from earthworks would have a long-term, moderate, beneficial impact.

Impacts Related to Park Operations Actions

Removing some buildings from the park housing program, in accordance with NPS policy, would allow the buildings to be offered for leasing or visitor-services concessions. The potential to secure and invest capital funds from non-governmental sources through leasing historic structures, resulting in the preservation and rehabilitation of those structures, would have long-term, moderate, beneficial impacts.

Greater and more strategic use of volunteer hours through restructuring of park staff and prioritization of tasks would enable more regular care of monuments, resulting in long-term, minor, beneficial impacts.

Greater and more strategic use of volunteer hours through restructuring of park staff and prioritization of tasks would also enable careful clearing of earthworks, resulting in long-term, moderate, beneficial impacts.

Cumulative Impact

Present and reasonably foreseeable future actions that would contribute to the cumulative impact on historic buildings and structures would be the same as those described under Alternative A. These projects, along with the impacts of Alternative B, would result in both a long-term, moderate, beneficial cumulative impact and a long-term, major, adverse cumulative impact to the park's historic buildings and structures. Alternative B would contribute both an appreciable, beneficial and appreciable adverse increment to the cumulative impact.

Impacts of Alternative C: NPS Preferred

Impacts Related to Cultural Resource Management Actions

Actions and resulting impacts are the same under Alternative C as for Alternative B, except that demolition of early 20th century maintenance buildings under Alternative C would have a long-term, major, adverse impact. The NPS would consult with the ACHP and the Pennsylvania SHPO to develop appropriate mitigation activities.

Impacts Related to Natural Resource Management Actions

Actions and resulting impacts are the same under Alternative C as for Alternative B.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Actions and resulting impacts are the same under Alternative C as for Alternative B.

Impacts Related to Park Operations Actions

Actions and resulting impacts are the same under Alternative C as for Alternative B.

Cumulative Impact

Present and reasonably foreseeable future actions that would contribute to the cumulative impact on historic buildings and structures would be the same as those described for Alternative A. These projects, along with the impacts of Alternative C, would result in both a long-term, moderate, beneficial cumulative impact and a long-term, major, adverse cumulative impact to the park's historic buildings and structures. Alternative C would contribute both an appreciable, beneficial and appreciable, adverse increment to the cumulative impact.

Conclusion

The overall impact to historic buildings and structures under Alternative A would be long-term, minor to major, and adverse. It would contribute a noticeable, adverse increment to both the long-term, moderate, beneficial cumulative impact and the long-term, major, adverse cumulative impact. Although there would be a major, adverse impact due to the loss of the 19th century Boulware portion of the Pawling Mansion, this impact would not constitute an impairment of historic buildings or structures within the park. Because the resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, and (3) identified in relevant NPS planning documents as being of significance would remain, Alternative A would not result in an impairment of park resource or values related to historic buildings or structures.

The overall long-term impact to historic buildings and structures under Alternatives B and C would be minor to major and beneficial. The overall long-term impact also would be major and adverse. Each alternative would contribute both an appreciable, beneficial and appreciable, adverse increment to the long-term, moderate, beneficial cumulative impact and the long-term, major, adverse cumulative impact. The major, adverse impact resulting from the demolition of several post-encampment era buildings listed on the National Register would not constitute an impairment of historic buildings or structures within the park because these resources or values are not (1) necessary to fulfill specific purposes identified in the park's enabling legislation; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified in relevant NPS planning documents as being of significance. Therefore, Alternatives B and C would not result in an impairment of park resources or values related to historic buildings and structures.

4.3.3 Impacts to Archeological Resources

Methodology

Certain important research questions about human history can only be answered by the actual physical material of cultural resources. Archeological resources have the potential to answer, in whole or in part, such research questions. An archeological site can be eligible for the National Register if the site has yielded, or may be likely to yield, information important in prehistory or history. An archeological site can be nominated to the National Register in one of three historic contexts or levels of significance: local, state, or national. Three archeological overviews and assessments were completed for the park by 2002. Their delineation of significant and contributing features is the basis for the analysis of impacts in this section.

For purposes of analyzing impacts to archeological resources, thresholds of change for the intensity of an impact are based upon the potential of the site to yield information important in prehistory or history, as well as the probable historic context of the affected site. The thresholds of change are defined below.

Negligible: Impact is at the lowest levels of detection with neither adverse nor beneficial consequences.

Minor: Adverse Impact – Disturbance of a site(s) results in little, if any, loss of integrity.

Regulations and Guidelines Related to Archeological Resources

- 36 CFR 79 – Curation of Federally Owned and Administered Archaeological Collections
 - ACHP implementing regulations regarding the "Protection of Historic Properties" (36 CFR 800)
 - Archaeological and Historic Preservation Act of 1974, as amended
 - Archaeological Resources Protection Act of 1979, as amended
 - NHPA of 1996, as amended
 - Native American Graves Protection and Repatriation Act of 1990
 - *Secretary of the Interior Standards for Treatment of Historic Properties* (1996)
 - DO #28, "Cultural Resources Management Guidelines"
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Beneficial Impact – Maintenance and preservation of a site(s).

Moderate: Adverse Impact – Disturbance of a site(s) does not diminish the integrity of the site(s) to the extent that its National Register eligibility is jeopardized.

Beneficial Impact – Stabilization of a site(s).

Major: Adverse Impact – Disturbance of a site(s) diminishes the integrity of the site(s) to the extent that it is no longer eligible for listing on the National Register.

Beneficial Impact – Active intervention to preserve the site(s).

Impacts of Alternative A: No-Action

Impacts Related to Cultural Resource Management Actions

Under Alternative A, archeological resources would be managed as is.

Any construction or disturbance on NPS lands, for example a water infiltration correction project at a historic building, would continue to be preceded by survey to identify and avoid any archeological resources. Where resources cannot be avoided, there could be negligible to moderate, adverse impacts. If any unknown significant resources were uncovered during ground-disturbing activity, procedures to implement Section 106 of the NHPA would be instituted.

Under this alternative, no archeological survey or excavation would be undertaken for research purposes. This would result in no impacts to the resources; however, no additional knowledge would be obtained.

Impacts Related to Natural Resource Management Actions

Natural resource management practices would continue as is. No reforestation or clearing would take place, posing no impacts to archeological resources. Archeological resources within forests would continue to be at risk, however, as large trees growing on them die and topple, uprooting substantial areas. There could be a long-term, moderate, adverse impact on these resources.

Failure to revegetate forest floors would allow continued erosion, causing a long-term, moderate to major, adverse impact to archeological resources.

Continued participation in local and regional initiatives to manage stormwater and thereby prevent streambank erosion would have long-term, minor, beneficial impacts.

Impacts Related to Public Use, Enjoyment, and Experience Actions

There could be continuing negligible to moderate, adverse impacts to archeological resources from trampling through off-trail visitor use.

The lack of interpretation of archeological processes, sites, and resources in the park would lead to continuing lack of awareness, appreciation, and spirit of stewardship on the part of the public.

Impacts Related to Park Operations Actions

Any construction or disturbance on NPS lands, for example a drainage or road project, would continue to be preceded by survey to identify and avoid any archeological resources. Where resources cannot be avoided, there could be long-

term, negligible to moderate, adverse impacts. If any unknown significant resources were uncovered during ground-disturbing activity, procedures to implement Section 106 of the NHPA would be instituted.

A continuing lack of staff in the field, particularly law enforcement staff, could result in less observation at the sites of archeological resources, which are located throughout the park. Lack of surveillance could result in long-term, moderate, adverse impacts due to “pot-hunting.”

Cumulative Impact

Some projects identified for assessment of the potential cumulative impact would pose no adverse impacts on the park’s archeological resources. A Phase I archeological survey was completed for potentially affected areas within the park for the RCC projects and the relocation of PA Route 23. No National Register-eligible resources were found.

The widening of the PA Turnpike would take place beyond the park boundary and in an area that would be expected to yield few artifacts. Failure to fully infiltrate stormwater runoff, however, would exacerbate flooding in Valley Creek, causing long-term, moderate to major, adverse impacts to archeological resources.

Preliminary alternatives for remediation of asbestos within the park propose excavation of “hot spots” and/or application of fill to those areas. In every case, this work would take place in areas already greatly altered by 19th century quarrying and 19th and 20th century manufacturing, which are archeologically sterile. Such remediation would pose no impact to the park’s archeological resources.

Implementation of the Valley Creek Restoration Plan and the Valley Creek Stormwater Management Plan in the watershed upstream of the park would have long-term, moderate, beneficial impacts to archeological resources along Valley Creek, particularly in the vicinity of Washington’s Headquarters.

These projects, along with the impacts of Alternative A, would result in both a long-term, moderate, beneficial cumulative impact and a long-term, negligible to major, adverse cumulative impact. Alternative A would contribute an appreciable, adverse increment to the cumulative impacts.

Impacts of Alternative B

Under Alternative B, archeological sites and resources would be stabilized and protected against destruction from erosion and inappropriate visitor use. Sites and resources would be a foundation of park interpretation, and new research would be emphasized.

Impacts Related to Cultural Resource Management Actions

Ongoing investigation of archeological resources would result in localized disturbances to archeological deposits, posing a long-term, minor, adverse impact. The new information gained as a result of ongoing investigation would aid in the understanding of many aspects of the park’s history, however.

If any unknown, significant archeological resources were uncovered during ground-disturbing activity, Section 106 consultation would continue.

Impacts Related to Natural Resource Management Actions

Reforestation could pose long-term, negligible to moderate, adverse impacts from ground disturbance due to planting. Activities would be preceded by survey, careful planning, and consultation to avoid, or if necessary, mitigate impacts. Revegetation would eliminate continuing erosion and exposure of archeological resources, however, causing a long-term, minor, beneficial impact.

Continued participation in local and regional initiatives to manage stormwater and thereby prevent streambank erosion would have long-term, minor, beneficial impacts.

Impacts Related to Public Use, Enjoyment, and Experience Actions

The proposed location for the pedestrian bridge across the Schuylkill River was selected to avoid or minimize impacts to archeological resources. No adverse impacts are predicted on the south side. Adverse impacts are possible on the north side to unknown pre-contact or canal-related resources. Final design of the bridge would be preceded by testing to identify any resources present. If resources could not be avoided, the park would consult with the ACHP and the Pennsylvania SHPO on mitigation. If any unknown, significant resources were uncovered during ground-disturbing activity, procedures to implement Section 106 of the NHPA would be instituted.

Increased use of archeological sites and resources for public education and interpretation would increase awareness and appreciation of resources, thereby increasing support for their preservation, and resulting in a long-term, moderate, beneficial impact.

Relocation and/or closure of trails away from earthworks would have a long-term, moderate, beneficial impact. Better management of park trails, and particularly the elimination of miles of personal trails illegally established by visitors, would have a long-term, minor, beneficial impact.

Impacts Related to Park Operations Actions

The leasing or visitor-services concessions use of some park buildings could cause impacts to archeological resources near the buildings, through the addition of driveways and walks, construction of underground utility lines or septic fields, and/or parking. In cases in which the known archeological resources contribute to the National Register significance of the park, new uses would be limited to those which would pose no greater than long-term, moderate, adverse impacts to the archeological resources. If resources could not be avoided, the park would consult with the ACHP and the Pennsylvania SHPO on mitigation. If any unknown, significant archeological resources were uncovered during ground-disturbing activity, procedures to implement Section 106 of the NHPA would be instituted.

Removal of parking lots from the landscape could have long-term, minor to moderate, adverse impacts if any features had escaped prior destruction from construction of the lots.

Increased surveillance and public education to prevent looting would have a long-term, major, beneficial impact.

Greater and more strategic use of volunteer hours through restructuring of park staff and prioritization of excavation and documenting tasks would result in long-term, minor, beneficial impacts.

Cumulative Impact

Present and reasonably foreseeable future actions that would contribute to impacts on archeological resources would be the same as those described under Alternative A. These projects, along with the impacts of Alternative B, would result in both a long-term, major, adverse cumulative impact and a long-term, moderate, beneficial cumulative impact on the park's archeological resources. Alternative B would contribute both a noticeable, beneficial and noticeable, adverse increment to the cumulative impacts.

Impacts of Alternative C: NPS Preferred

Under Alternative C, archeological sites and resources would be stabilized and protected against destruction from erosion and inappropriate visitor use. Sites and resources would be a foundation of park interpretation, and new research would be emphasized.

Impacts Related to Cultural Resource Management Actions

Actions and resulting impacts are the same under Alternative C as for Alternative B.

Impacts Related to Natural Resource Management Actions

Actions and resulting impacts are the same under Alternative C as for Alternative B.

Impacts Related to Public Use, Enjoyment, and Experience Actions

A program of public archeology is included in Alternative C. Increased use of archeological sites and resources for public education and interpretation would increase awareness and appreciation of resources, thereby increasing support for their preservation, resulting in a long-term, moderate, beneficial impact.

As with Alternative B, closure and/or relocation of trails away from earthworks would have a long-term, minor, beneficial impact.

Impacts Related to Park Operations Actions

Actions and resulting impacts are the same under Alternative C as for Alternative B.

Cumulative Impact

Present and reasonably foreseeable future actions that would contribute to impacts on archeological resources would be the same as those described under Alternative A. These projects, along with the impacts of Alternative C, would result in both a long-term, major, adverse cumulative impact and a long-term, moderate, beneficial cumulative impact on the park's archeological resources. Alternative C would contribute both a noticeable, beneficial and noticeable, adverse increment to the cumulative impacts.

Conclusion

The overall impact to archeological resources under Alternative A would be long-term, negligible to moderate, and adverse. Alternative A would contribute an appreciable, adverse increment to the long-term, moderate, beneficial cumulative impact and the long-term, negligible to major, adverse cumulative impact.

Overall, Alternatives B and C would include long-term, minor to moderate, adverse impacts; however, they would also result in long-term, moderate to major, beneficial impacts. Unlike Alternative A, Alternatives B and C would contribute both a

noticeable, beneficial increment and a noticeable, adverse increment to the long-term, major, adverse cumulative impact and long-term, moderate, beneficial cumulative impact on archeological resources.

Because there would be no major adverse impacts associated with Alternative A, B, or C to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified in relevant NPS planning documents as being of significance, Alternatives A, B, and C would not result in an impairment of park resources or values related to archeological impacts.

4.3.4 Impacts to Archives and Collections

Methodology

Museum collections (historic artifacts, natural specimens, and archival and manuscript material) may be threatened by fire, theft, vandalism, natural disasters, and humidity. The preservation of museum collections is an ongoing process of preventative conservation, supplemented by conservation treatment when necessary. The primary goal is preservation of artifacts in as stable a condition as possible to prevent damage and minimize deterioration. The park's archives and collection are characterized in a 1995 Scope of Collections Statement and a draft 1997 update. The findings of these documents form the basis for the analysis of impacts in this section.

For purposes of analyzing potential impacts, the thresholds of change for the intensity of an impact are defined as follows

Negligible: Impact is at the lowest level of detection – barely measurable, with no perceptible consequences, either adverse or beneficial, to archives and collections.

Minor: Adverse Impact – Impact would affect the integrity of a few items in the museum collection but would not degrade the usefulness of the collection for future research and interpretation.

Beneficial Impact – Impact would stabilize the current condition of the collection or its constituent components to minimize degradation.

Moderate: Adverse Impact – Impact would affect the integrity of many items in the museum collection and diminish the usefulness of the collection for future research and interpretation.

Beneficial Impact – Impact would improve the condition of the collection or its constituent parts from the threat of degradation.

Major: Adverse Impact – Impact would affect the integrity of most items in the museum collection and destroy the usefulness of the collection for future research and interpretation.

Beneficial Impact – Impact would secure the condition of the collection as a whole or its constituent components from the threat of further degradation.

Regulations and Guidelines Related to Archives and Collections

- 36 CFR 79 – Curation of Federally Owned and Administered Archaeological Collections
 - ACHP implementing regulations regarding the “Protection of Historic Properties” (36 CFR 800)
 - Antiquities Act of 1906
 - Museum Properties Management Act of 1955, as amended
 - NHPA of 1966, as amended
 - *Secretary of the Interior Standards for Treatment of Historic Properties* (1996)
 - Executive Order 11593, “Protection and Enhancement of the Cultural Environment”
 - NPS Museum Handbook
 - DO #28, “Cultural Resources Management Guidelines”
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Impacts of Alternative A: No-Action

Under Alternative A, archives and collections would continue to be managed as is.

Impacts Related to Cultural Resource Management Actions

Archives and collections would continue to be housed in multiple locations, most in historic structures. The continuing inadequate environmental conditioning and/or lack of security in most of the locations could cause long-term, minor to moderate, adverse impacts, including damage or loss of some materials over time.

Impacts Related to Natural Resource Management Actions

There would be no impacts to archives and collections due to natural resource management actions.

Impacts Related to Public Use, Enjoyment, and Experience Actions

There would be no impacts to archives and collections due to public use, enjoyment, and experience actions.

Because only a small portion of the collection would be exhibited, the general public would not enjoy access to or understanding of the collections. The library and the stored archives and collections would continue to be largely unavailable to scholars and researchers, due to location and lack of staff.

Impacts Related to Park Operations Actions

Continued lack of staff and funding to maintain and protect the structures in which archives and collections are stored could cause long-term, minor to moderate, adverse impacts, including damage or loss of some materials over time.

Cumulative Impact

Projects identified for assessment of potential cumulative impacts would pose no adverse or beneficial impacts on the park's archives and collections; therefore, there would be no cumulative impact to this resource.

Impacts of Alternative B

In this alternative, the NPS would consolidate its museum and library collections in a single place, with modern environmental and security controls. The NPS would construct a new facility, rehabilitate part of the Welcome Center, or relocate the collection to a shared off-site facility. As staffing allowed, the collections would be available for viewing and study by visitors and scholars.

Impacts Related to Cultural Resource Management Actions

Provision of a curatorial storage facility providing appropriate environmental, fire safety, and security conditions would have a long-term, major, beneficial impact on the condition and preservation of park archives and collections. The process of relocating the archives and collections could cause damage to some individual items; however, the overall condition would be greatly improved.

Archeological excavations could produce additional artifacts, requiring additional curatorial storage.

Impacts Related to Natural Resource Management Actions

There would be no impacts to archives and collections due to natural resource management actions.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Because a greater proportion of the collection would be exhibited, the general public would enjoy more access to or understanding of the collections. Depending on the location of the facility (on- or off-site), the library and the stored archives and collections would be more available to scholars and researchers. If located off-site, users would have to travel beyond park boundaries.

The availability of appropriate facilities for greater public and scholarly availability of archives and library resources through development of a curatorial storage facility would lead to greater support for their preservation, resulting in a long-term, major, beneficial impact.

Impacts Related to Park Operations Actions

Greater and more strategic use of volunteer hours through restructuring of park staff and prioritization of curatorial tasks would result in long-term, minor to moderate, beneficial impacts.

Cumulative Impact

Projects identified for assessment of potential cumulative impacts would pose no adverse or beneficial impacts on the park's archives and collections; therefore, there would be no cumulative impact to this resource.

Impacts of Alternative C: NPS Preferred

As with Alternative B, in this alternative the NPS would consolidate its museum and library collections in a single place, with modern environmental and security controls. The NPS would construct a new facility, rehabilitate part of the Welcome Center, or relocate the collection to a shared off-site facility. As staffing allowed, the collections would be available for viewing and study by visitors and scholars.

Impacts Related to Cultural Resource Management Actions

Actions and resulting impacts would be the same for Alternative C as for Alternative B.

Impacts Related to Natural Resource Management Actions

Actions and resulting impacts would be the same for Alternative C as for Alternative B.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Actions and resulting impacts would be the same for Alternative C as for Alternative B.

Impacts Related to Park Operations Actions

Actions and resulting impacts would be the same for Alternative C as for Alternative B.

Cumulative Impact

Projects identified for assessment of potential cumulative impacts would pose no adverse or beneficial impacts on the park's archives and collections; therefore, there would be no cumulative impact to this resource.

Conclusion

The overall impact to archives and collections under Alternative A would be long-term, minor to moderate, and adverse, while the overall impact to archives and collections under Alternatives B and C would be long-term, moderate to major, and beneficial. Because there would be no major adverse impact to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified in relevant NPS planning documents as being of significance, there would be no impairment of resources or values related to archives and collections as a result of Alternative A, B or C.

There would be no cumulative impact related to any of the proposed alternatives because projects identified for analysis of cumulative impacts would pose no adverse or beneficial impacts to park archives and collections.

4.4 Impacts to Physical and Natural Resources

4.4.1 Impacts to Topography and Geologic Resources

Methodology

The impact analysis and conclusions for possible impacts to topography and geologic resources are based on known and potential geological resources within the park (mostly caves and karst topography), a review of existing literature and studies, information provided by experts in the NPS and other agencies, park staff insights, and professional judgment. Map locations of topography and geological resources were compared with locations of proposed developments and modifications of existing facilities. The thresholds of change for the intensity of an impact are defined as follows

- Negligible:*** The action would result in a change to topography and/or geologic resources, but the change would be so small that it would not be of any measurable or perceptible consequence.
- Minor:*** The action would result in a change to topography and/or geologic resources, but the change would be small and localized and of little consequence.
- Moderate:*** The action would result in a change to topography and/or geologic resources; the change would be readily apparent, but the area of disturbance would be localized. Some features would be lost.
- Major:*** The action would result in an obvious change to topography and/or geologic resources, including a substantial or widespread loss or alteration of features.

Regulations and Guidelines Related to Topography and Geologic Resources

- Clean Water Act of 1977, as amended
 - Federal Cave Resources Protection Act of 1998
-

Impacts of Alternative A: No-Action

Impacts Related to Cultural Resource Management Actions

Under Alternative A, cultural resource management actions would pose no impact to topography or geologic resources.

Impacts Related to Natural Resource Management Actions

Natural resource management actions under Alternative A would generally maintain all natural resources as is. With respect to geologic resources, the park's caves and karst topography would remain unchanged, uninterpreted, and receive minimal protection. This would result in a long-term, minor, adverse impact.

Impacts Related to Public Use, Enjoyment, and Experience Actions

The actions related to public use, enjoyment, and experience would pose no impacts to topography or geologic resources. The caves and karst topography would remain uninterpreted to the public.

Impacts Related to Park Operations Actions

Park operations actions would not impact topography or geologic resources.

Cumulative Impact

Present and reasonably foreseeable future actions that would contribute to impacts on topography and geologic resources would include the RCC projects, improvements to PA Route 23 in Upper Merion Township, remediation of the ARS, and implementation of the Valley Creek Stormwater Management and Restoration Plans.

Each of the RCC projects and the improvements to PA Route 23 in Upper Merion Township would involve some excavation into bedrock in places where the terrain is rocky or shallow, as along the Schuylkill River and other tributaries. Construction in these areas would result in minor but permanent modifications to the natural topography; however, in most cases these changes would be localized in previously disturbed rights-of-way and would not impact any notable feature valued for geologic or natural resource interpretation. These projects would result in a long-term, minor, adverse impact.

Depending on the selected method, remediation of the ARS may require excavation of soils and replacement with a clean fill cap, resulting in a minor change in topography. The impact of the fill material to the karst topography would be determined through detailed engineering studies but could be long-term, minor to moderate, and adverse.

Restoring the streambank along Valley Creek could require grading and stabilization measures that could potentially have minor impacts to topography in this area.

These projects, along with the impacts of Alternative A, would result in a long-term, minor, adverse cumulative impact to topography and geologic resources, with Alternative A contributing an imperceptible, adverse increment to the cumulative impact.

Impacts of Alternative B

Impacts Related to Cultural Resource Management Actions

Cultural resource management actions under Alternative B would pose no impacts to topography or geologic resources.

Impacts Related to Natural Resource Management Actions

Alternative B proposes improvements to the protection of the park's caves and its karst topography, most notably through development of a cave and karst management plan, resulting in a long-term, moderate, beneficial impact.

Impacts Related to Public Use, Enjoyment, and Experience Actions

The caves and karst topography would be interpreted, thus enhancing visitor understanding of and advocacy for this resource, a long-term, minor, beneficial impact.

Several parking lots within the core interpretive areas would be removed, graded to their historic contours, and revegetated. This change in topography would be long-term, minor, and beneficial.

Impacts Related to Park Operations Actions

Under Alternative B, park operations actions would not impact topography or geologic resources.

Cumulative Impact

Present and reasonably foreseeable future actions that would contribute to the cumulative impact scenario are described under Alternative A. These projects, along with Alternative B, would result in both a long-term, minor, adverse cumulative impact and a long-term, minor, beneficial cumulative impact to topography and geologic resources. Alternative B would contribute an imperceptible, beneficial increment to the cumulative impact.

Impacts of Alternative C: NPS Preferred***Impacts Related to Cultural Resource Management Actions***

Under Alternative C, the existing quarries (with the exception of Cave Quarry) within the Grand Parade would be filled to their historic contour, thus restoring the historic topography in this area and resulting in a long-term, moderate, beneficial impact. Impacts to the karst topography would vary and could potentially be long-term and adverse, depending on the amount of fill required in each area. To address this and determine specific impacts, engineering studies would be completed prior to implementation.

Impacts Related to Natural Resource Management Actions

Actions and resulting impacts would be the same for Alternative C as for Alternative B.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Actions and resulting impacts would be the same for Alternative C as for Alternative B.

Impacts Related to Park Operations Actions

Actions and resulting impacts would be the same for Alternative C as for Alternative B.

Cumulative Impact

Present and reasonably foreseeable future actions that would contribute to the cumulative impact scenario are described under Alternative A. These projects, along with Alternative C, would result in a long-term, moderate, adverse cumulative impact and a long-term, moderate, beneficial cumulative impact to topography and geologic resources. Alternative C would contribute both a noticeable, beneficial and noticeable, adverse increment to the cumulative impact.

Conclusion

The overall impact to topography and geologic resources under Alternative A would be long-term, minor, and adverse, and it would contribute an imperceptible, adverse increment to the long-term, minor, adverse cumulative impact.

Alternative B would result in a long-term, minor, beneficial impact to topography and geologic resources, and it would contribute an imperceptible, beneficial increment to both the long-term, minor, adverse cumulative impact and the long-term, minor, beneficial cumulative impact.

Alternative C would result in long-term, moderate, adverse and long-term, moderate, beneficial impacts to topography and geologic resources. Alternative C would contribute both a noticeable, beneficial increment and a noticeable, adverse increment to the long-term, moderate, beneficial and long-term, moderate adverse cumulative impacts to topography and geologic resources.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified in relevant NPS planning documents as being of significance, Alternatives A, B, and C would not result in impairment of park resources or values related to topography and geologic resources.

Regulations and Guidelines Related to Soils

- Clean Water Act of 1977, as amended
 - Farmland Protection Policy Act of 1980 and 1995
 - Analysis of Impacts on Prime and Unique Agricultural Lands in Implementing NEPA
-

4.4.2 Impacts to Soils

Methodology

Available information on soils potentially impacted in various areas of the park was compiled. Map locations of soils (including prime farmland and hydric soils) were compared with locations of proposed developments and modifications of existing facilities. The thresholds of change for the intensity of an impact are defined as follows

Negligible: Soils would not be affected or the impacts to soils would be below or at the lower levels of detection. Any impacts to soils would be slight and no long-term impacts to soils would occur.

Minor: The impacts to soils would be detectable. Impacts to soil area would be small.

Moderate: The impacts to soils would be readily apparent, likely long-term, and result in a change to the soil character over a relatively wide area.

Major: The impacts to soils would be readily apparent, long-term, and substantially change the character of the soils over a large area in and out of the park.

Impacts of Alternative A: No-Action

Impacts Related to Cultural Resource Management Actions

Under Alternative A, cultural resource management actions would pose no impacts to soils.

Impacts Related to Natural Resource Management Actions

Under Alternative A, current ground covers would remain. In some cases, this would provide good stabilization and coverage for soils. In other cases, this would result in exposed soil, erosion, and compaction, a long-term, minor, adverse impact. Failure to manage the over-abundant herd of white-tailed deer and the associated impacts on ground cover would result in continuing erosion of unprotected soils, a long-term, moderate, adverse impact.

Continuing cooperation with upstream municipalities to manage stormwater flow into Valley Creek would minimize soil disturbance along the streambank, resulting in a long-term, moderate, beneficial impact.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Alternative A proposes no changes to park facilities; therefore, the amount of impervious surface would remain the same. Personal trails and those authorized trails that threaten resources would be closed. However, these trails would not be revegetated, so erosion and weathering could continue. The result would be a short-term, minor, adverse impact unless the area naturally revegetates.

Impacts Related to Park Operations Actions

Park operations actions would pose no impact to soils within Valley Forge NHP.

Cumulative Impact

Several present and reasonably foreseeable future actions would contribute to the cumulative impact on soils at Valley Forge NHP, including the RCC projects and improvements to PA Route 23, remediation of the ARS, and the Valley Creek Stormwater Management and Restoration Plans.

Most of the construction work for the RCC projects and improvements to PA Route 23 in Upper Merion Township would be limited to existing rights-of-way and other developed areas where native soils have been previously and extensively disturbed or modified during the original construction of roadways. During the reconstruction and modification, these “developed” soils would be temporarily disturbed, resulting in a short-term, minor, adverse impact. Once construction is complete, soils would be covered with vegetation or impervious surface and maintained.

Depending on the selected method for remediation of the ARS, soils could be temporarily disturbed and possibly removed from the area. These soils would be replaced with a clean fill cap, thus resulting in a long-term, major, beneficial impact.

Working with partners to manage stormwater and the Valley Creek watershed would prevent erosion and have a long-term, moderate, beneficial impact on the soils along the streambank.

These projects, along with the impacts of Alternative A, would result in both short-term, minor, adverse and long-term, moderate, beneficial cumulative impacts to soils at Valley Forge NHP. Alternative A would contribute an imperceptible increment to the cumulative impact.

Impacts of Alternative B

Impacts Related to Cultural Resource Management Actions

Under Alternative B, the park would take a more active role in securing and protecting soils associated with cultural resources. Trails would be relocated to prevent people from walking on the erodable earthworks. Some short-term, negligible impacts would occur as trails were realigned.

If a collections curatorial facility were constructed, soil would be disturbed. This facility would be located in an already developed area and appropriate stormwater management would be used; thus, impacts would be short-term, minor, and adverse.

Impacts Related to Natural Resource Management Actions

Reforestation to accelerate the recovery of the natural systems of the park would include the stabilization of soils and provision of nutrients necessary to support native vegetation. The plantings would provide protection to the soils and stabilize some areas against erosion, a long-term, moderate, beneficial impact. Control of the over-abundant herd of white-tailed deer and resulting elimination of heavy browsing would allow the restoration of ground cover, protecting soils from erosion, resulting in a long-term, moderate, beneficial impact.

More active cooperation with partners and upstream municipalities to manage stormwater flow into Valley Creek would minimize soil disturbance along the streambank, resulting in a long-term, moderate, beneficial impact.

Fields currently used for farming would be converted to a natural vegetative state. This would relieve the pressure placed on the soils by farming practices and allow them to support the region's native habitat for the long-term. Although Fuller and Waggoner Fields (south of US 422) have not been used for agriculture for many years, reforestation would allow for the soils to receive proper nutrients and protection. The result would be a long-term, minor to moderate, beneficial impact.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Within the Interpretive Focus Zone, new interpretive features would be added, which could result in new impervious cover or the addition of some fill material to the sites. Under Alternative B, these features would be small; therefore, the impact would be long-term, minor, and adverse.

Modifications to the main park entrance or gateway would involve temporary disturbance of soils in this area. The majority of the impacts would be in previously disturbed areas and rights-of-way, a short-term, minor, adverse impact.

Trails would be formalized and/or connected to other trails. These connections would result in some cut/fill activity and potentially the displacement of a negligible amount of soil, a long-term, minor, adverse impact. Unmaintainable trails and personal trails would be closed and revegetated, stopping erosion and runoff in these areas, a long-term, minor, beneficial impact.

The construction of the Schuylkill River and Valley Creek bicycle/pedestrian crossings would result in some soil disturbance at the landings and piers, a long-term, minor, adverse impact.

Several parking lots would be removed, graded to their historic contours, and revegetated, resulting in short-term disturbance of the soils - a minor, adverse impact - and long-term stabilization - a minor, beneficial impact.

Impacts Related to Park Operations

Under the action alternatives, the park would work with PECO to transfer remaining overhead electric lines underground. This effort would have short-term, negligible, adverse impacts but no measurable long-term impacts.

Cumulative Impact

Present and reasonably foreseeable future actions that would contribute to cumulative impacts to soils would be the same as those described under Alternative A. These projects, along with Alternative B, would result in both short-term, minor, adverse and long-term, moderate, beneficial cumulative impacts to soils. Alternative B would contribute a noticeable, beneficial increment to the overall cumulative impact.

Impacts of Alternative C

Impacts Related to Cultural Resource Management Actions

As with Alternative B, the park would take a more active role in securing and protecting soils associated with cultural resources. Trails would be relocated to prevent people from walking on the erodable earthworks. There would be some short-term, negligible impacts as trails were realigned.

If a collections curatorial facility were constructed, soil would be disturbed. This facility would be located in an already developed area and appropriate stormwater management would be used; thus, impacts would be short-term, minor, and adverse.

In addition to those impacts, Alternative C proposes to add fill material to several quarries, thus returning the historical topography of the area. This would introduce clean fill (approximately 30,000,000 cubic yards) in an area where the existing soils are contaminated with asbestos. The fill material would be vegetated to provide stability and protection from erosion. The impact from these actions would be long-term, moderate, and beneficial.

Impacts Related to Natural Resource Management Actions

Actions and resulting impacts would be the same under Alternative C as for Alternative B.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Within the Interpretive Focus Zone, new interpretive features would be added which would result in new impervious cover and the addition of some fill material to the sites. Under Alternative C, these displays would cause the temporary disturbance of soils during construction (short-term, minor, adverse), as well as long-term, minor, adverse impacts.

Modifications to the main park entrance or gateway would involve temporary disturbance of soils in this area. The majority of the impacts would be in previously disturbed areas and rights-of-way, a short-term, minor, adverse impact.

As with Alternative B, trails would be formalized and/or connected to other trails. These connections would result in some cut/fill activity and potentially the

displacement of a negligible amount of soil, a long-term, minor, adverse impact. Unmaintainable trails and personal trails would be closed and revegetated, stopping erosion and runoff in these areas, a long-term, minor, beneficial impact.

As with Alternative B, the construction of the Schuylkill River and Valley Creek bicycle/pedestrian crossings would result in some soil disturbance at the landings and piers, a long-term, minor, adverse impact.

Several parking lots would be removed, graded to their historic contours, and revegetated, resulting in short-term disturbance of the soils - a minor, adverse impact - and long-term stabilization - a minor, beneficial impact.

Impacts Related to Park Operations Actions

As with Alternative B, the park would work with PECO to transfer any aboveground power lines underground. This would have a short-term, negligible, adverse impact.

In addition, the park would remove the existing maintenance facility from within the Grand Parade and construct a new facility within the Park Support Zone. This action would result in short-term displacement of soils during demolition and construction. Soil would be added to the existing area to return the topography to historic contours, and it would be revegetated, thus stabilizing the soils for the long-term. This would result in a long-term, moderate, beneficial impact. Relocating the facility to the previously disturbed Park Support Zone would minimize disturbance of native soils.

Cumulative Impact

Present and reasonably foreseeable future actions that would contribute to the cumulative impact on soils would be the same as those described under Alternative A. These projects, along with Alternative C, would result in a short-term, minor, adverse cumulative impact to soils, as well as both a long-term, moderate, beneficial cumulative impact and a long-term, minor, adverse cumulative impact. Alternative C would contribute noticeably to the overall cumulative impact.

Conclusion

The overall impact to soils under Alternatives A and B would be short-term, minor, adverse and long-term, moderate, beneficial. For both alternatives, the overall cumulative impact would be short-term, minor, and adverse, as well as long-term, moderate, and beneficial. Alternative A would contribute imperceptibly to the cumulative impact, while Alternative B would contribute noticeably.

Under Alternative C, the overall impact would be short-term, minor, and adverse; long-term, moderate, and adverse; and long-term, moderate, and beneficial. Alternative C would contribute noticeably to the short-term, minor, adverse cumulative impact to soils, as well as both the long-term, moderate, beneficial and the long-term, minor, adverse cumulative impact.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified in relevant NPS planning documents as being of significance, Alternatives A, B, and C would not result in an impairment of park resources or values related to soils.

4.4.3 Impacts to Surface Waters and Groundwater

Methodology

The *NPS Management Policies 2006* state that the NPS will “take all necessary actions to maintain or restore the quality of surface waters and ground waters within the parks consistent with the Clean Water Act and all other applicable federal, state, and local laws and regulations.”

In order to assess the magnitude of impacts to park surface water and groundwater resources under the various alternatives, state water quality standards governing the waters of the park were examined and compared to baseline water quality data. The following impact thresholds were applied in order to describe the relative changes in water quality under the management alternatives.

- Negligible:** Impacts are chemical, physical, or biological impacts that would not be detectable, would be well below water quality standards or criteria, and would be within historical or desired water quality conditions.
- Minor:** Impacts (chemical, physical, or biological) would be detectable but would be well below water quality standards or criteria and within historical or desired water quality conditions.
- Moderate:** Impacts (chemical, physical, or biological) would be detectable but would be at or below water quality standards or criteria; however, historical baseline or desired water quality conditions would be altered on a short-term basis.
- Major:** Impacts (chemical, physical, or biological) would be detectable and would be frequently altered from the historical baseline or desired water quality conditions; and/or chemical, physical or biological water quality standards or criteria would be slightly and singularly exceeded on a short-term basis.

Impacts of Alternative A: No-Action

Under Alternative A, current drainage patterns and pollutant levels would remain the same or continue to degrade over time, as management and decreased staffing resulted in worsening conditions. Overall, a long-term, minor, adverse impact on surface waters and groundwater would result.

Impacts Related to Cultural Resource Management Actions

The cultural resource management actions would pose no impacts to water resources within park.

Impacts Related to Natural Resource Management Actions

To address Valley Creek issues, the park would continue existing working relationships with the Trustee Council and Valley Creek Restoration Partnership to implement the Valley Creek restoration plan, with Chester County and upstream municipalities to manage stormwater, and with Trout Unlimited and other partners to implement stabilization efforts along Valley Creek.

Regulations and Guidelines Related to Surface Waters and Groundwater

- Clean Water Act of 1977, as amended
- Federal Water Pollution Control Act of 1972, as amended
- Fish and Wildlife Coordination Act of 1934, as amended
- Safe Drinking Water Act
- Water Resources Council's Principles and Standards
- Water Resources Planning Act of 1965
- Watershed Protection and Flood Prevention Act
- Executive Order 12088, "Federal Compliance with Pollution Control Standards"
- PA Scenic River Designation

Dams at Fatlands and on Valley Creek and Meyers Run would remain. Except for current work on Valley Creek, no action would be taken to restore other streams, posing a continued long-term, moderate, adverse impact.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Because visitor experience and use patterns within the park would remain unchanged, there would be no alteration to current hydrologic or water quality conditions. Under the No-Action Alternative, those trails that were determined to be detrimental to park resources, including water resources, would be closed, eliminating soil erosion into the creeks, resulting in a long-term, minor, beneficial impact.

Under the No-Action Alternative, no traffic management initiatives would be undertaken within the park. Increasing traffic volumes on park roads and surrounding roads would increase stormwater pollutants. Retention of excess parking lots would have a minor, adverse impact on the park's water resources due to prevention of natural infiltration, the exacerbation of stormwater dumped into waterways, and pollution loads.

Impacts Related to Park Operations Actions

There would be no impacts to water resources due to park operations actions.

Cumulative Impact

Present and reasonably foreseeable actions that could contribute to the cumulative impact to surface waters and groundwater would include the RCC projects and the improvements to PA Route 23, the PA Turnpike widening and new interchange, and the Valley Creek Stormwater Management and Restoration Plans.

For the RCC projects and PA Route 23 improvements, the proposed reconstruction and upgrade of the transportation facilities in these previously disturbed areas would require expansion or reconstruction of some existing drainage structures (such as existing culverts) and would therefore impact the local stream/surface water network. Short-term impacts are expected during the construction phase and can be successfully mitigated through strict adherence to approved erosion and sedimentation control plans and best management practices. Small areas of permanent impact, such as culvert extensions requiring additional stream enclosures, would result in the permanent loss of open channel waters and associated aquatic habitat; thus the overall impact of these projects on surface water quality would be long-term, moderate, and adverse.

Most of the construction work for the RCC projects and PA Route 23 improvements would be limited to existing rights-of-way and other developed areas where natural terrain has been previously disturbed during the original construction of roadways. As noted in the geologic resources assessment, each of the projects would involve some excavation into bedrock in places where the terrain is rocky or shallow to bedrock as along the Schuylkill River and other tributaries. Construction in these areas would result in minor, but permanent modifications in the natural topography and geology. In most cases these changes would be localized in previously disturbed rights-of-way and would not involve depths that encroach upon groundwater resources.

One of the projects, the Betzwood Bridge replacement project, proposes alternative schemes for drainage improvements, one of which includes deep cuts into bedrock and the potential for impact to the localized groundwater system in this area. As described

in Chapter 3: Affected Environment, there are several natural springs located within Valley Forge NHP, a number of which occur in association with Port Kennedy Run, in the vicinity of the former train station. The larger spring in this location is estimated to have a discharge of 50-100 gallons/minute and believed to be related to the large and complex karstic formations that underlie the central portion of the park. This spring provides the majority of the base flow to this tributary. Potential impacts could be long-term and moderate if this flow were disturbed or re-routed due to foundation and or drainage facility construction activities. These potential impacts could be better defined and mitigated with careful foundation investigations during the final design process with a resulting moderate, adverse impact that might be temporary or avoided through appropriate mitigation design.

Over six miles of the PA Turnpike lie within the Valley Creek watershed. The increase in impervious surface associated with the widening of the turnpike would have long-term, major, adverse impacts to Valley Creek and its tributaries and to Trout Run, if a maximal use of best management practices for stormwater management is not considered, including measures to infiltrate stormwater, slow its rate, and remove pollutants.

The current proposal for the PA Route 29 turnpike slip ramp calls for dumping of all stormwater into the Warner Quarry, from which water is pumped into a tributary of Cedar Creek. No controls of volume or temperature are proposed, and no infiltration is proposed. Particulate matter would be removed but not pollutants. Any spills would reach Valley Creek. This proposal, if implemented, would have long-term, major, adverse impacts on Valley Creek.

The Valley Creek Stormwater Management and Restoration Plans would seek to improve water quality in Valley Creek. Stabilization of streambanks, improved stormwater management, and clean-up of the waters would result in a long-term, moderate, beneficial impact.

These projects, along with Alternative A, would result in long term, moderate, beneficial and long-term, major, adverse cumulative impacts to surface waters and groundwater. Alternative A would contribute an imperceptible increment to the overall cumulative impact.

Impacts of Alternative B

The most notable actions that would affect surface waters and groundwater would be the implementation of a resource stewardship plan that would involve the use of a whole-watershed management strategy and the adoption of low-impact development techniques for stormwater management. Based on the impaired nature of water resources in the region (as defined by the DEP), and the park's relatively small size compared to the entire watershed, Alternative B would have a long-term, moderate, beneficial impact on water resources.

Impacts Related to Cultural Resource Management Actions

The cultural resource management actions would not impact water resources.

Impacts Related to Natural Resource Management Actions

Under Alternative B, biological resources would be managed to restore and preserve natural diversity and abundance in a manner that would accelerate natural recovery of impacted resources. This would include efforts to enhance plant and animal

species that inhabit or contribute to the health and protection of water resources. Some specific actions that would accomplish this goal would be the continued coordination with local governments to maintain Valley Creek and Fisher Run's value as open space corridors. Surface and groundwater systems would be properly buffered to prevent overload of stormwater runoff. This would improve natural levels of water quality and quantity. Returning the park's water resources to their natural conditions could be furthered by the potential removal of the Valley Creek, Meyer's Run, Colonial Springs, and Fatlands dams. All of these actions would be implemented through a whole-watershed management strategy, a means of managing water resources that would ensure actions designed to protect water resources would not be compromised by actions taken outside of the park boundaries.

In addition to work along the water's edge, the entire park landscape would be maintained as is. This would allow drainage patterns to be maintained and natural buffers to remain.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Under Alternative B, the park would remove several parking areas, reducing impervious surface within the park, which would aid precipitation to filter into groundwater systems and minimize pollutant loads for stormwater to transport to nearby waterways.

Revegetation of closed trails would provide enhanced ground cover and soil stability, reducing the sedimentation into surface waters. Some connections between loop trails would be established and/or formalized. This would require changes to topography, but the use of stabilizing vegetation at the trails' edges would mean that the sedimentation impact would be negligible.

The establishment of new pedestrian/bicycle bridges over the Schuylkill River and Valley Creek would result in short- and long-term impacts to water resources. The construction would disrupt the river bottom, potentially introducing a high level of sedimentation and disruption to river hydrology. However, based on the park's commitment to low-impact design, these impacts would be minimized and localized to the point that they would be negligible. Because the bridges would only be used by bicyclists and pedestrians, pollutants would be limited to debris that was carried onto them from the surrounding trail and would not constitute an appreciable pollutant source.

Similarly, the construction of a Schuylkill River water trail landing would not constitute an appreciable impact to water resources. Construction would be within the limits of low-impact development and would not require any impacts to the river bed. The landing would be designed to protect the exposed shoreline from wave action, which would reduce erosion and capture any loose sediment before it was washed into the river. The overall improvement of stormwater management at the park would result in long-term, moderate, beneficial impacts to surface waters.

Impacts Related to Park Operations Actions

Under the action alternatives, the changes to staffing would allow the park to take a more active role in regional initiatives to protect and restore the quality of the Valley Creek watershed and the Schuylkill River watershed.

Acquisition of remaining lands within the park's authorized boundary, including Saint Gabriel's Field and Valley Forge Crossing, would allow the park to ensure that no detrimental actions occur within its boundaries. As a result, the impacts related to park operations would have a long-term, moderate, beneficial impact.

Cumulative Impact

Present and reasonably foreseeable future actions that would contribute to cumulative impacts on surface waters and groundwater would be the same as those described under Alternative A. These projects, along with Alternative B, would result in both a long term, moderate, beneficial cumulative impact and a long-term, major, adverse cumulative impact to surface water and groundwater. Alternative B would contribute a noticeable, beneficial increment to the overall cumulative impact.

Impacts of Alternative C: NPS Preferred

The most notable actions that would affect surface waters and groundwater would be the implementation of a resource stewardship plan that would involve the use of a whole-watershed management strategy and the adoption of low-impact development techniques for stormwater management. Based on the impaired nature of water resources in the region (as defined by the DEP), and the park's relatively small size compared to the entire watershed, Alternative C would have a long-term, moderate, beneficial impact on water resources.

Impacts Related to Cultural Resource Management Actions

Stormwater runoff patterns would be altered through the re-establishment of historic contours, which would redirect drainage patterns. This could expose some areas to increased amounts of stormwater runoff, which could lead to increased erosion, resulting in a long-term, minor, adverse impact to surface waters and groundwater.

Impacts Related to Natural Resource Management Actions

Actions and resulting impacts would be the same under Alternative C as those described for Alternative B.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Actions and resulting impacts would be the same under Alternative C as those described for Alternative B.

Impacts Related to Park Operations Actions

Actions and resulting impacts would be the same under Alternative C as those described for Alternative B.

Cumulative Impact

The cumulative impact and the contribution to the cumulative impact by Alternative C would be the same as described for Alternative B.

Conclusion

The overall impact to surface waters and groundwater under Alternative A would be long-term, minor, and adverse. Alternative A would contribute an imperceptible, adverse increment to the long-term, moderate, beneficial and long-term, major, adverse cumulative impacts.

For Alternatives B and C, the overall impact to surface waters and groundwater would be long-term, moderate, and beneficial. Both Alternatives B and C would contribute a noticeable, beneficial increment to the long term, moderate, beneficial and long-term, major adverse cumulative impacts to surface waters and groundwater.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified in relevant NPS planning documents as being of significance, Alternatives A, B, and C would not result in an impairment of park resources or values related to surface waters and groundwater.

4.4.4 Impacts to Floodplains

Methodology

Floodplains are defined by the NPS Floodplain Management Guideline (1993) as "the lowland and relatively flat areas adjoining inland and coastal waters, including flood-prone areas of offshore islands, and including, at a minimum, that area subject to temporary inundation by a regular flood." The NPS has adopted the policy of preserving floodplain values and minimizing potentially hazardous conditions associated with flooding. Impact analysis and conclusions for possible impacts to 100- and 500-year floodplains were based on the on-site inspection of known and potential 100- and 500-year floodplains within the park (see Figure 3-4), review of existing literature and studies, information provided by experts in the NPS and other agencies, Valley Forge NHP staff insights, and professional judgment. Map locations of 100- and 500-year floodplains were compared with locations of proposed developments and modifications to existing facilities. The thresholds of change for the intensity of an impact are defined as follows.

Negligible: There would be no change in the ability of a floodplain to convey floodwaters, or its values and functions. Proposed actions would not contribute to the flood.

Minor: Changes in the ability of a floodplain to convey floodwaters, or its values and function, would be barely measurable and local. Proposed actions would not contribute to the flood, and no mitigation would be needed.

Moderate: Changes in the ability of a floodplain to convey floodwaters, or its values and functions, would be measurable but local. Proposed actions could contribute to the flood. The impact could be mitigated by modification of proposed facilities in floodplains.

Major: Changes in the ability of a floodplain to convey floodwaters, or its values and functions, would be measurable and widespread. P would contribute to the flood. The impact could not be mitigated by modification of proposed facilities in floodplains.

Impacts of Alternative A: No-Action

Impacts Related to Cultural Resource Management Actions

There would be no impact to the floodplain as a result of proposed cultural resource management actions.

Regulations and Guidelines Related to Floodplains

- Clean Water Act of 1977, as amended
 - Watershed Protection and Flood Prevention Act
 - Executive Order 11988, "Floodplain Management"
 - DO #77-2, "Floodplain Management"
-

Impacts Related to Natural Resource Management Actions

Alternative A proposes minimal protection and management of water resources within the park, basically addressing problems on an as-needed basis. Floodplain values would be improved by the restoration and streambank stabilization of Valley Creek, a long-term, moderate, beneficial impact. However, minimal stormwater management both within and outside the park boundaries would continue to erode streambanks (including the smaller streams within the park), thus minimizing the floodplain in some areas and expanding in others where possible. If left unchecked, a long-term, moderate, adverse impact to floodplain values would result, as resources located within the floodplain (both cultural and natural) could potentially be lost.

Several failing dams within the park would remain, further contributing to the man-made impacts on the floodplain. At some locations, silt deposits from heavy stormwater loads would continue to widen the floodplain behind these dams.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Under the No-Action Alternative, public use, enjoyment, and experience actions would not change the conditions of the floodplains within Valley Forge NHP. For the most part, these areas would remain undeveloped. The River Trail, part of the Valley Creek Trail, and portions of the Betzwood picnic area would remain in the floodplain. These facilities do not consist of any structure that alters the natural processes within the floodplain.

Impacts Related to Park Operations Actions

Park operations actions not would impact floodplains.

Cumulative Impact

Present and reasonably foreseeable future projects that would contribute to the cumulative impact on floodplains would include the RCC projects, the PA Turnpike widening and new interchange, and the Valley Creek Stormwater Management and Restoration Plans.

The RCC projects include reconstruction of the Betzwood Bridge, which was removed in 1995, and the upgrade and widening of the existing US 422 bridge. Both bridges cross the Schuylkill River and its associated floodplain. Hydrologic and hydraulic evaluations have been made of the impacts of the existing and proposed structures on the ability of the natural floodplain to convey floodwaters. The analyses conclude that the proposed bridge replacement and rehabilitation projects would not result in any additional obstructions or reductions in waterway openings and therefore would not have any major, adverse impacts on the 100-year surface water elevations over the allowable FEMA thresholds. The overall impact of the RCC projects on floodplain values would be long-term, minor, and adverse.

Over six miles of the PA Turnpike lie within the Valley Creek watershed. The increase in impervious surface associated with the widening of the turnpike would have long-term, major, adverse impacts to the floodplains of Valley Creek and its tributaries and to that of Trout Run, if a maximal use of best management practices for stormwater management is not considered, including measures to infiltrate stormwater and slow its rate to prevent scouring.

The current proposal for the PA Route 29/PA Turnpike slip ramp calls for dumping of all stormwater into the Warner Quarry, from which water is pumped into a tributary of Cedar Creek. No infiltration or control of volume is proposed. This

proposal, if implemented, would have long-term, major, adverse impacts to the floodplain of Valley Creek.

Floodplain values would be improved by the restoration and streambank stabilization of Valley Creek, a long-term, moderate, beneficial impact.

These projects, along with Alternative A, would result in both a long-term, major, adverse cumulative impact and a long-term, moderate, beneficial cumulative impact to floodplains. Alternative A would contribute a noticeable increment to the overall cumulative impact.

Impacts of Alternative B

Impacts Related to Cultural Resource Management Actions

There would be no impact to floodplains as a result of proposed cultural resource management actions.

Impacts Related to Natural Resource Management Actions

In an effort to enhance natural land coverage, the park would remove remaining coal silt from the former impounding basins along the Schuylkill River and revegetate these areas. This would not only remove a potential sedimentation source but provide protection and stability to the floodplain, allowing its natural capabilities to be maximized. The impact to floodplains from these actions would be long-term, minor, and beneficial.

Several failing dams within the park would also be removed. By eliminating these additional man-made structures from within the floodplain, natural hydrologic flows should return and sedimentation build up would be minimized, a long-term, moderate, beneficial impact.

Floodplain values also would be improved by the restoration and streambank stabilization of Valley Creek, a long-term, moderate, beneficial impact.

Impacts Related to Public Use, Enjoyment, and Experience Actions

All the action alternatives propose construction of pedestrian/bicycle crossings of the Schuylkill River and Valley Creek. There could be long-term, minor, adverse impacts from new bridge piers; however, the structures would not alter existing floodplain values.

The River Trail, part of the Valley Creek Trail, and portions of the Betzwood picnic area would remain in the floodplain. These facilities do not consist of any structure that alters the natural processes within the floodplain.

Impacts Related to Park Operations Actions

Park operations actions would not impact floodplains.

Cumulative Impact

Present and reasonably foreseeable future actions that would contribute to the cumulative impact on floodplains would be the same as those described under Alternative A. These projects, along with the impacts of Alternative B, would result in both a long-term, major, adverse cumulative impact and a long-term, moderate, beneficial cumulative impact to floodplains. Alternative B would contribute a noticeable, beneficial increment to the overall cumulative impact.

Impacts of Alternative C

Impacts Related to Cultural Resource Management Actions

There would be no impact to floodplains as a result of proposed cultural resource management actions.

Impacts Related to Natural Resource Management Actions

Actions and resulting impacts from natural resource management actions would be the same under Alternative C as for Alternative B.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Actions and resulting impacts related to public use, enjoyment, and experience actions would be the same under Alternative C as for Alternative B.

Impacts Related to Park Operations Actions

Park operations actions would not impact floodplains.

Cumulative Impact

The cumulative impact and the contribution to the cumulative impact by Alternative C would be the same as described for Alternative B.

Conclusion

The overall impact to floodplains under Alternative A would be long-term, moderate, beneficial and long-term, moderate, adverse. Alternative A would contribute noticeably to the long-term, moderate, beneficial and long-term, major, adverse cumulative impacts.

The overall impact to floodplains under Alternatives B and C would be long-term, moderate, and beneficial. Each alternative would contribute a noticeable, beneficial increment to both the long-term, moderate, beneficial and long-term, major, adverse cumulative impacts.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified in relevant NPS planning documents as being of significance, Alternatives A, B, and C would not result in an impairment of park resources or values related to floodplains.

4.4.5 Impacts to Wetlands

Methodology

Wetlands are "lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface" (USFWS 1979).

The impact analysis and conclusions for possible impacts to wetlands were based on the on-site inspection of known and potential wetlands within the park (jurisdictional and non-jurisdictional), review of existing literature and studies, information provided by experts in the NPS and other agencies, Valley Forge NHP staff insights, and professional judgment. Map locations of wetlands were compared with locations

Regulations and Guidelines Related to Wetlands

- Clean Water Act of 1977, as amended
- Executive Order 11990, "Protection of Wetlands"
- Director's Order #77-1, "Wetland Protection and Procedural Manual"

of proposed developments and modifications of existing facilities. Predictions about short- and long-term site impacts were based on previous studies of impacts to wetlands from similar projects and recent scientific data. The thresholds of change for the intensity of an impact are defined as follows.

- Negligible:*** Wetlands would not be affected or the impacts to the resource would be below or at the lower levels of detection.
- Minor:*** The impacts to wetlands would be detectable and relatively small in terms of area and the nature of the change. The action would affect a limited number of individuals of plant or wildlife species within the wetland.
- Moderate:*** The impacts to wetlands would be readily apparent over a relatively small area but the impact could be mitigated by restoring previously degraded wetlands. The action would have a measurable effect on plant or wildlife species within the wetland, but all species would remain indefinitely viable.
- Major:*** The impacts to wetlands would be readily apparent over a relatively large area. The action would have measurable consequences for the wetland area that could not be mitigated. Wetland species dynamics would be upset, and plant and/or animal species would be at risk of extirpation from the area.

Impacts of Alternative A: No-Action

Impacts Related to Cultural Resource Management Actions

The cultural resource management actions under Alternative A would not impact wetlands.

Impacts Related to Natural Resource Management Actions

Wetlands are sensitive systems, capable of diffusing pollutants from stormwater but only at a certain level. Like other water resources, when wetlands are overwhelmed with pollutants, their integrity is compromised. Under Alternative A, there would be no action taken to reduce or control the quality and quantity of stormwater runoff. This would result in a long-term, minor, adverse impact to wetlands.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Personal trails are located throughout the park. In some cases these trails have been cut through wetlands and provide a potential threat. Under Alternative A, some of these trails may be closed; however, they would not be revegetated. This would result in continued sedimentation and erosion. History has proven that a large storm event has the potential to completely wash out these trails, delivering an unmanageable amount of sediment to the surrounding water and wetlands. As a result, this alternative could result in a long-term, minor, adverse impact to wetlands.

Impacts Related to Park Operations Actions

Proposed park operations actions would not impact wetlands.

Cumulative Impact

Present and reasonably foreseeable future projects that would contribute to the cumulative impact scenario for wetlands include the RCC projects and the Valley Creek Stormwater Management and Restoration Plans.

Most of the construction work for the RCC projects would be limited to existing rights-of-way and other developed areas where natural areas have been previously and extensively disturbed and modified during the original construction of roadways. Field surveys of the limits of proposed disturbance have identified jurisdictional wetlands located within and adjacent to the project limits. For the most part, these areas are associated with existing stream crossings. New impacts are largely related to potential extensions of existing culvert or pipe crossings and expected to be relatively small in total area and in the nature of the change, as most of these areas are heavily impacted and degraded by severe upstream stormwater runoff. Vegetated wetlands have been identified in or adjacent to some of these reconstruction areas and would likely be impacted by the culvert or pipe extensions. These potential impacts would be localized at relatively small sites and would be mitigated by restoration, creation, or enhancement work at the site of impact or at other previously degraded wetland sites within the project area. Field inspection has identified the presence of many degraded areas with multiple opportunities for wetlands mitigation options. The overall impact would be long-term, minor, and adverse.

The Valley Creek Stormwater Management and Restoration Plans would seek to improve wetland quality and function within Valley Creek, a long-term, minor, beneficial impact.

These projects, along with Alternative A, would result in both a long-term, minor, beneficial and long-term, minor adverse cumulative impact to wetlands. Alternative A would contribute an imperceptible increment to the overall cumulative impact.

Impacts of Alternative B

Impacts Related to Cultural Resource Management Actions

The cultural resource management actions under Alternative B would not impact wetlands.

Impacts Related to Natural Resource Management Actions

Under Alternative B, biological resources would be managed to restore and preserve natural diversity and abundance in a manner that would accelerate natural recovery of impacted resources. This would include efforts to enhance plant and animal species that inhabit or contribute to the health and protection of wetlands. Specific actions that would address wetlands would be plantings within the siltation basins. This would create a more natural wetland environment, and allow the basins to function as natural wetlands. The result would be a long-term, moderate, beneficial impact to wetlands.

Impacts Related to Public Use, Enjoyment, and Experience Actions

A small wetland exists within the Grand Parade interpretive focus area. Proposed changes in interpretation (new waysides, technological devices, observation platforms, etc.) would avoid impacting this wetland, so there would be no impact.

All the action alternatives propose construction of pedestrian/bicycle crossings of the Schuylkill River and Valley Creek. Depending on the north side location for the Schuylkill River crossing, there could be a long-term, minor, adverse impact from a new bridge pier. The boardwalk structure would be located at a sufficient height to minimize shading of the wetland vegetation below. At the location of the Valley Creek pedestrian/bicycle bridge crossing, wetland impacts (beyond the open water) would be avoided. A long-term, minor, adverse impact would result from these actions.

Personal trails would be closed and revegetated, eliminating impacts to wetlands, a long-term, moderate, beneficial impact.

Impacts Related to Park Operations Actions

Under the action alternatives, the park would take a more active role in regional initiatives to protect and restore the quality of the Valley Creek watershed and the Schuylkill River watershed, a long-term, moderate, beneficial impact.

Cumulative Impact

Present and reasonably foreseeable future actions that would contribute to the cumulative impact scenario for wetlands would be the same as those described under Alternative A. These projects, along with Alternative B, would result in both a long-term, moderate, beneficial cumulative impact and a long-term, minor, adverse cumulative impact to wetlands. Alternative B would contribute noticeably to the overall cumulative impact.

Impacts of Alternative C: NPS Preferred

Impacts Related to Cultural Resource Management Actions

Cultural resource management actions would have no impact on wetlands.

Impacts Related to Natural Resource Management Actions

Actions and resulting impacts to wetlands under Alternative C would be the same as those described for Alternative B.

Impacts Related to Public Use, Enjoyment, and Experience Actions

A small wetland exists within the Grand Parade interpretive focus area. Alternative C proposes an immersive experience within this area, which would include landscape rehabilitation and construction of interpretive pavilions (new waysides, technological devices, observation platforms, etc., also would be included). These actions would attempt to avoid impacting the small wetland; however, if avoidance is not possible, an appropriate mitigation strategy would be developed, resulting in a long-term, minor, adverse impact.

All the action alternatives propose construction of pedestrian/bicycle crossings of the Schuylkill River and Valley Creek. Depending on the north side location for the Schuylkill River crossing, there could be a long-term, minor, adverse impact from a new bridge pier. The boardwalk structure would be located at a sufficient height to minimize shading of the wetland vegetation below. At the location of the Valley Creek pedestrian/bicycle bridge crossing, wetland impacts (beyond the open water) would be avoided. A long-term, minor, adverse impact would result from these actions.

Personal trails would be closed and revegetated, eliminating impacts to wetlands, a long-term, moderate, beneficial impact.

Impacts Related to Park Operations Actions

Actions and resulting impacts related to wetlands under Alternative C would be the same as those described in Alternative B.

Cumulative Impact

The cumulative impact and the contribution to the cumulative impact by Alternative C would be the same as described for Alternative B.

Conclusion

The overall impact to wetlands under Alternative A would be long-term, minor, and adverse. Alternative A would contribute imperceptibly to both the long-term, minor, beneficial cumulative impact and the long-term, minor, adverse cumulative impact.

The overall impact to wetlands under Alternatives B and C would be long-term, moderate, beneficial and long-term, minor, adverse. Alternatives B and C would each contribute a noticeable increment to the long-term, moderate, beneficial and long-term, minor, adverse cumulative impacts.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified in relevant NPS planning documents as being of significance, Alternatives A, B, and C would not result in an impairment of park resources or values related to wetlands.

4.4.6 Impacts to Vegetation

Methodology

All available information on vegetation and vegetative communities potentially impacted in Valley Forge NHP was compiled and reviewed. Map locations of sensitive plant species, such as state-listed species, and high-value habitats were identified. The thresholds of change for the intensity of an impact are defined below.

- Negligible:*** No vegetation would be affected or some individual plants could be affected as a result of the alternative, but there would be no impact to the vegetative community. The impacts would be on a small scale, and no species of special concern would be affected.
- Minor:*** The alternative would affect some individual plants and would also affect a relatively minor portion of that species' vegetative community.
- Moderate:*** The alternative would affect some individual plants and would also affect a sizeable segment of the species' vegetative community over a relatively large area.
- Major:*** The alternative would have a considerable effect on plant populations, including species of special concern, and affect a relatively large area in and out of the park.

Impacts of Alternative A: No-Action

The present relative percentages of forest and meadow/open fields would be maintained with a few exceptions, as noted below; however, the lack of management would cause the health of these systems to deteriorate over time. Overall, Alternative A would have a long-term, major, adverse impact on vegetation.

Impacts Related to Cultural Resource Management Actions

Park-wide, the cultural landscape would be maintained as is, thus the existing relative percentages of forest and meadow/open field would remain the same. The exception would be Fuller Field and Wagonseller Field: without active

Regulations and Guidelines Related to Vegetation

- Executive Order 13112, "Invasive Species"
 - Endangered Species Act of 1973, as amended
-

management of the progression from old field to forest, the fields would be overrun with exotic invasive species, a long-term, moderate, adverse impact.

Impacts Related to Natural Resource Management Actions

Natural resources would continue to be minimally managed: eradication of invasive species within select locations would occur only as funds became available, posing a long-term, moderate, adverse impact. Meadows would continue to be managed only through annual mowing, resulting in an increasing presence of exotic invasive species. Due to the continued loss of available habitat outside park boundaries, high levels of deer browsing would continue and potentially increase within forested areas, preventing the growth of native species, continuing the elimination of mid-story and groundcover strata, and increasing the invasion of exotic species within these areas. As a result, the health and natural diversity of these systems would continue to deteriorate, a long-term, major, adverse impact.

Augmentation of forested buffers along US 422 would result in a negligible increase in forested cover.

Impacts Related to Public Use, Enjoyment, and Experience Actions

To maintain the existing visual experience within the park, park staff would work with neighboring townships to ensure new construction is adequately screened. This increase in forested cover, however, would be negligible.

The continued lack of natural resources interpretation would mean that opportunities for public appreciation and stewardship would be missed.

Impacts Related to Park Operations Actions

Park operations actions would pose no impact to vegetation within the park.

Cumulative Impact

Present and reasonably foreseeable future projects that could contribute to the cumulative impact on vegetation include the RCC projects and PA Route 23 improvements, widening of the PA Turnpike, remediation of the ARS, and the Valley Creek Stormwater Management and Restoration Plans.

Most of the construction work for the RCC projects and the PA Route 23 improvements in Upper Merion Township would be limited to existing rights-of-way and other developed areas where native plant communities and other vegetation have been previously and extensively disturbed and modified during the original construction of roadways. Field surveys of the limits of proposed disturbance have not identified any significant or sizeable areas of native plant communities. Much of the existing right-of-way and immediately adjacent areas consists of clusters and individual plants of native and non-native landscaping of limited wildlife value. The construction activities in the vicinity of the bridge structures along the Schuylkill River and at other smaller stream crossings would involve impact to small areas of riparian vegetation, which serve important buffer functions for stream and aquatic habitat protection and also function as habitat and travel corridors for terrestrial wildlife. Due to the high degree of urbanization and associated previous disturbance, most of the vegetation in these areas is a mixture of native and non-native invasive species. The riparian vegetation component within the disturbance areas is very narrow in width – in most cases a fringe of single canopy trees and thus relatively limited in ecological function. The overall impact of these projects on vegetation would be long-term, minor, and adverse, since the areas of impact would be

relatively small and do not represent important functional native plant communities and do not affect any species of special concern or their habitat. Mitigation would be required to restore any minor loss in riparian buffer function or in right-of-way landscaping and would consist of replanting with native plant species and the control and management of invasive species within the project impact areas. Such mitigation is likely to be highly successful, especially with post-construction monitoring and maintenance.

Grading for the widening of the PA Turnpike would extend to the limits of the turnpike's property along the boundary of the park. The existing tree screen between the park and the turnpike will be destroyed. Unless the screen is replanted, this would result in a long-term, minor, adverse impact.

Remediation of the ARS would include removal of existing vegetation, a short-term, minor, adverse impact. However, clean fill soils would be revegetated, so no change in overall vegetation cover would result.

The Valley Creek Stormwater Management and Restoration Plans would add forested, riparian vegetation within the streambank corridor, a long-term, minor, beneficial impact.

These projects, along with Alternative A, would result in a long-term, major, adverse cumulative impact to vegetation. Alternative A would contribute an appreciable, adverse increment to the overall cumulative impact.

Impacts of Alternative B

The most notable impact to vegetation would result from the preparation and implementation of management plans for white-tailed deer and invasives species. Overall, Alternative B would have short-term, minor, adverse and long-term, major, beneficial impacts on vegetation.

Impacts Related to Cultural Resource Management Actions

Although management of cultural resources is improved under the action alternatives, impacts to vegetation under Alternative B would be the same as those described under Alternative A. The major features of the cultural landscape would be preserved as is, thus the existing percentages of forest and meadow/open field would remain relatively the same. Fuller Field and Waggon seller Field would continue to progress from old field to forested conditions, resulting in a negligible change to existing vegetative patterns. In addition, to enhance preservation of earthworks and archeological sites, vegetative cover would be improved and/or added to deter trampling and prevent erosion.

Impacts Related to Natural Resource Management Actions

Management of natural resources under the action alternatives would be greatly improved. In Alternative B, management plans for white-tailed deer and invasive species would be developed to improve the health of the forests and meadows within the park. By minimizing deer browse and the invasion of exotic species, along with the planting of native species within select areas, natural diversity would be greatly improved within these areas. If successful, the result would be a long-term, major, beneficial impact to vegetation.

Augmentation of forested buffers along US 422 would result in a negligible increase in forested cover.

Impacts Related to Public Use, Enjoyment, and Experience Actions

New trails (including the crossing of the Schuylkill River and Valley Creek) and small interpretive devices within the interpretive focus areas would be constructed, resulting in a minor loss of vegetation.

To improve the visual experience within the park, staff would work with neighboring townships and residents to establish vegetative buffers around the perimeter of the park. This increase in forested cover, however, would be minor.

Trails that are unmaintainable and/or damage the natural and cultural resources would be closed and replanted with native species to further deter use by visitors and minimize vegetative losses.

Several parking lots would be removed from within the interpretive areas and revegetated with native species, a long-term, minor, beneficial impact.

Impacts Related to Park Operations Actions

Several non-contributing structures within the park would be demolished and the areas revegetated with native species. Precautions would be taken to minimize the spread of invasive species. The overall increase in vegetative cover would be minor (approximately 5 acres, including the demolished parking lots).

Cumulative Impact

Present and reasonably foreseeable future actions that would contribute to the cumulative impact on vegetation would be the same as those described under Alternative A. These projects, along with Alternative B, would result in a long-term, major, beneficial cumulative impact to vegetation, as well as a long-term, moderate, adverse cumulative impact. Alternative B would contribute an appreciable, beneficial increment to the overall cumulative impact.

Impacts of Alternative C: NPS Preferred

Impacts Related to Cultural Resource Management Actions

The cultural landscapes of three key interpretive areas would be rehabilitated to their 18th century conditions (Muhlenberg's Brigade, part of the Grand Parade, and Washington's Headquarters); however, the general percentages of forest and meadow/open field would remain relatively the same. Fuller Field and Waggoner Field would continue to progress from old field to forested conditions, resulting in a negligible change to existing vegetative patterns. In addition, to enhance preservation of earthworks and archeological sites, vegetative cover would be improved and/or added to deter trampling and prevent erosion.

Impacts Related to Natural Resource Management Actions

Actions and resulting impacts related to natural resource management actions would be the same under Alternative C as for Alternative B.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Rehabilitation of the interpretive focus areas and re-establishment of some vistas would result in the removal/modification of approximately 20 acres of vegetation, a long-term, moderate, adverse impact. However, approximately 15 acres of this

vegetative cover would remain, converting from forest to meadow habitat, a long-term, moderate, beneficial impact.

Impacts Related to Park Operations Actions

Actions and resulting impacts related to park operations actions would be the same under Alternative C as for Alternative B. In addition, the relocation of the maintenance facility from within the Grand Parade to the Park Development Zone would result in a small increase in tall grass meadow habitat, a long-term, minor, beneficial impact.

Cumulative Impact

Present and reasonably foreseeable future actions that would contribute to the cumulative impact on vegetation would be the same as those described under Alternative A. These projects, along with Alternative C, would result in a long-term, major, beneficial cumulative impact to vegetation, as well as a long-term, moderate, adverse cumulative impact. Alternative C would contribute an appreciable increment to the overall cumulative impact.

Conclusion

The overall impact to vegetation under Alternative A would be long-term, major, and adverse. It would contribute an appreciable, adverse increment to the long-term, major, adverse cumulative impact. Because there would be a major adverse impact to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, and (3) identified in relevant NPS planning documents as being of significance, there may be an impairment of park resources or values related to vegetation. As noted in Section 4.2.6: Impairment, the impairment of vegetation within Valley Forge NHP may result from the continued heavy browsing by deer. The natural abundances, diversities, dynamics, and distributions of native plants and animals are key to a healthy ecological system and important to supporting the park's mission. Monitoring and research have shown a direct link between the deer population and the lack of forest structure, absence of native species, and spread of invasive plants. With little to no active management proposed under Alternative A, the deer population may continue to grow unchecked, adversely impacting and possibly impairing the surrounding resources.

The overall impact to vegetation under Alternative B would be short-term, minor, and adverse, as well as long-term, major, and beneficial. Alternative C would also have a long-term, major, beneficial impact to vegetation, although the short-term impact would be moderate and adverse. Both Alternatives B and C would contribute an appreciable, beneficial increment to the long-term, major, beneficial and long-term, moderate, adverse cumulative impacts.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's enabling legislation; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified in relevant NPS planning documents as being of significance, there would be no impairment of park resources or values related to vegetation as a result of Alternative B or C.

Regulations and Guidelines Related to Wildlife

- Bald and Golden Eagle Protection Act
 - Endangered Species Act of 1973, as amended
 - Migratory Bird Treaty Act
-

4.4.7 Impacts to Wildlife

Methodology

According to *NPS Management Policies 2006* (NPS 2006), the restoration of native species is a high priority. Management goals for wildlife include maintaining components and processes of naturally evolving park ecosystems, including natural abundance, diversity, and the ecological integrity of plants and animals. Information on wildlife was taken from park documents and records. The Valley Forge NHP natural resource management staff, the USFWS, and the Pennsylvania Natural Heritage Program also provided wildlife information. The thresholds of impact are as follows.

Negligible: There would be no observable or measurable impacts to native species, their habitats, or the natural processes sustaining them. Impacts would be of short duration and well within natural fluctuations.

Minor: Impacts would be detectable, but they would not be expected to be outside the natural range of variability and would not be expected to have any long-term impacts on native species, their habitats, or the natural processes sustaining them. Mitigation measures, if needed to offset adverse impacts, would be simple and successful.

Moderate: Breeding animals of concern are present; animals are present during particularly vulnerable life-stages, such as migration or juvenile stages; mortality or interference with activities necessary for survival can be expected on an occasional basis, but is not expected to threaten the continued existence of the species in the park unit. Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, and they could be outside the natural range of variability for short periods of time. Mitigation measures, if needed to offset adverse impacts, would be extensive and likely successful.

Major: Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, and they would be expected to be outside the natural range of variability for long periods of time or permanent. Loss of habitat might affect the viability of at least some native species. Extensive mitigation measures would be needed to offset any adverse impacts, and their success would not be guaranteed.

Impacts of Alternative A: No-Action

Wildlife resources would continue to be minimally managed. The result would be a long-term, major, adverse impact.

Impacts Related to Cultural Resource Management Actions

Cultural resource management actions would not impact wildlife.

Impacts Related to Natural Resource Management Actions

Biological resources would continue to be minimally managed. The park would continue to complete an identification of vital signs for naturally occurring communities. It would also continue to monitor sensitive habitats associated with

special status species. The park would continue to eradicate exotic invasive plant species as funding became available.

As heavy browsing by the white-tailed deer population continues and as invasive, exotic plants out-compete native species, the diversity of available habitats and subsequently wildlife capable of existing within those habitats, would continue to decrease, a long-term, major, adverse impact. Trampling and disturbance of meadow habitat by the white-tailed deer population also would continue to affect ground-nesting birds and other smaller species within these areas.

Valley Forge NHP would continue to participate in measures to protect water quality in Valley Creek by working with partners to implement stream restoration plans. The result of these actions would be cleaner water with consistent flows able to sustain and promote aquatic life, a long-term, minor to moderate, beneficial impact.

Impacts Related to Public Use, Enjoyment, and Experience Actions

The existing collection of trails would remain unchanged and continued use of trails (in particular personal trails through minimally disturbed areas) would create human intrusions into the natural environment. These intrusions are minimal and have been a regular part of the environment for some time now, and no increased impacts would be expected.

Impacts to wildlife would continue from vehicular traffic on roads in the park, as no traffic management initiatives would be undertaken. The primary impact from this action would be collisions between vehicles and animals, a long-term, minor, adverse impact to wildlife.

The continued lack of natural resources interpretation would mean that opportunities for public appreciation and stewardship would be missed.

Impacts Related to Park Operations Actions

Under the No-Action Alternative, Valley Forge NHP would acquire additional land within its boundary, which would protect wildlife resources, a long-term, negligible, beneficial impact.

Cumulative Impact

Present and reasonably foreseeable future projects that could contribute to the cumulative impact on wildlife include the RCC projects, widening of the PA Turnpike and new interchange, remediation of the ARS, and the Valley Creek Stormwater Management and Restoration Plans.

Most of the construction work for the RCC projects is limited to existing rights-of-way and other developed areas where native plant communities and other vegetation have been previously and extensively disturbed and modified during the original construction of roadways. Field surveys of the limits of proposed disturbance have not identified any significant or sizeable areas of natural habitats. Much of the existing right-of-way and immediately adjacent areas consists of clusters and individual plants of native and non-native landscaping of limited wildlife value. The construction activities in the vicinity of the bridge structures along the Schuylkill River and at other smaller stream crossings would involve impact to small areas of riparian vegetation which serve important buffer functions for stream and aquatic habitat protection and also function as habitat and travel corridors for terrestrial wildlife. Due to the high degree of urbanization and associated previous disturbance, most of the vegetation in

these areas is a mixture of native and non-native invasive species. The riparian vegetation component within the disturbance areas is very narrow in width – in most cases a fringe of single canopy trees and thus relatively limited in ecological function. The cumulative impact of the RCC projects on wildlife is thus assessed as minor, since the areas of impact would be relatively small, do not represent important functional native plant communities, and do not affect any species of special concern or their habitat. Mitigation would be required to restore any minor loss in riparian buffer function or in right-of-way landscaping and would consist of replanting with native plant species and the control and management of invasive species within the project impact areas. Such mitigation is likely to be highly successful, especially with post-construction monitoring and maintenance.

Widening of the PA Turnpike and the construction of the PA Route 29 slip ramp could cause the potential release of high quantities of polluted, warm water at a high volume into Valley Creek and its tributaries. This would have a long-term, major, adverse impact on wildlife.

These projects, along with Alternative A, would have a long-term, major, adverse cumulative impact on wildlife. Alternative A would contribute an appreciable, adverse increment to the cumulative impact.

Impacts of Alternative B

The most notable action that would affect wildlife is the improved management of biological resources to preserve and restore the natural abundances, diversities, dynamics, and distributions of native plant and animal populations within naturally occurring communities. The result would be a long-term, major, beneficial impact.

Impacts Related to Cultural Resource Management Actions

Action would be taken to stabilize and protect archeological resources, historic earthworks, and other cultural resources, which would result in enhanced vegetative communities and habitat for smaller animal species. It would also reduce the threat of erosion and unstable conditions to the surrounding habitat.

Impacts Related to Natural Resource Management Actions

Valley Forge NHP would actively manage natural resources to preserve and restore natural abundances, diversities, dynamics, and distributions of native species within the park. This management would include control of the white-tailed deer population and an active planting regimen that would accelerate natural recovery of resources.

The relative proportions of forests and meadows would remain as is, allowing current wildlife and wildlife habitat to remain. In addition, forests and meadows would be intensively managed to enhance their high habitat values. The overall impact to wildlife would be long-term, major, and beneficial.

The park would actively participate in whole-watershed management strategies to improve and protect water resources. By addressing the entire watershed, aquatic life within the park would be better protected.

The park would take part in programs aimed at improving air quality within the Philadelphia region. These programs would in turn improve air quality within the park, providing improved health for wildlife. Valley Forge NHP would also seek to improve lightscapes and soundscapes to avoid new man-made impacts to wildlife.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Modifications to the trail system would include new connections to internal and regional trails. The trails would be designed in a manner that would minimize impacts to wildlife. Improvements to the trail system could result in the reduction of personal trails that intrude on and threaten the integrity of many plant and animal species. The impact related to public use, enjoyment, and experience actions would be long-term, negligible to minor, and beneficial.

Impacts Related to Park Operations Actions

Under Alternative B, Valley Forge NHP would work to maintain or improve partnerships with local agencies and organizations to improve its ability to protect park resources. This effort, along with a continued strategy to acquire key remaining lands within the authorized boundary, would create a safer environment for the wildlife at Valley Forge by reducing pollution and other intrusions. Park operations actions would result in long-term, minor, beneficial impacts.

Cumulative Impact

Present and reasonably foreseeable future actions that would contribute to the cumulative impact on wildlife would be the same as those described under Alternative A. These projects, along with Alternative B, would have a long-term, major, adverse cumulative impact, as well as a long-term, major, beneficial cumulative impact on wildlife. Alternative B would contribute an appreciable, beneficial increment to the cumulative impact.

Impacts of Alternative C: NPS Preferred

The most notable actions that would affect wildlife would be the implementation of an active and accelerated natural resource management plan, including a white-tailed deer management plan. The overall impact to wildlife under Alternative C would be long-term, major, and beneficial.

Impacts Related to Cultural Resource Management Actions

The primary difference between Alternative C and the previous alternative would be the rehabilitation of selected areas of great interpretive value. In order to accomplish this, small sections of currently vegetated areas may be cleared and other areas may be converted from forest to meadow or meadow to forest. The areas that are to be cleared are not of high value and would constitute an imperceptible portion of the park's habitat. The overall impact would be long-term, minor, and adverse.

Impacts Related to Natural Resource Management Actions

Actions and resulting impacts would be the same under Alternative C as described for Alternative B.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Implementing alternative transportation options, closing select roads to public vehicular traffic, and use of traffic calming measures would reduce collisions between vehicles and wildlife. These actions would also minimize noise and light intrusions in some areas, creating a more natural environment for species located near the select roadways. The impact of public use, enjoyment, and experience actions would be long-term, minor, and beneficial.

Impacts Related to Park Operations Actions

Actions and resulting impacts under Alternative C would be the same as those described under Alternative B.

Cumulative Impact

The cumulative impact and contribution to the cumulative impact by Alternative C would be the same as described under Alternative B.

Conclusion

The overall impact to wildlife under Alternative A would be long-term, major, and adverse. Alternative A would contribute an appreciable, adverse increment to the long-term, major, adverse cumulative impact. Because there would be a major adverse impact to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, and (3) identified in relevant NPS planning documents as being of significance, there could be an impairment of park resources or values related to wildlife under Alternative A. As noted in Section 4.2.6: Impairment, the impairment of wildlife within Valley Forge NHP may result from continued heavy browsing by white-tailed deer. With little to no active management proposed under Alternative A, the deer population may continue to grow unchecked, adversely impacting and possibly impairing the surrounding resources.

The overall impact to wildlife under Alternatives B and C would be long-term, major, and beneficial. Each alternative would contribute an appreciable, beneficial increment to the long-term, major, adverse and long-term, major, beneficial cumulative impacts. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified in relevant NPS planning documents as being of significance, Alternatives B and C would not impair park resources or values related to wildlife.

4.4.8 Impacts to Air Quality**Methodology**

The 1963 Clean Air Act, as amended (42 U.S.C. 7401 et seq.), requires federal land managers to protect air quality, while *NPS Management Policies 2006* address the need to analyze potential air quality impacts during park planning. The Clean Air Act provides an affirmative responsibility to protect the park's air quality-related values (visibility, plants, animals, soils, water quality, cultural resources, and visitor health) from adverse air pollution impacts. Section 118 of the act requires Valley Forge NHP to meet all federal, state, and local air pollution standards. Section 176 (c) requires all federal activities and projects to conform to state air quality implementation plans to attain and maintain national ambient air quality standards. Because Valley Forge NHP is located in an area of Pennsylvania that is classified as a severe ozone non-attainment area, a statement regarding the transportation actions conformance with the state air quality implementation plan would be required once more detailed designs and analyses are completed.

Regulations and Guidelines Related to Air Quality

- Clean Air Act Amendments of 1990, as amended
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NPS Management Policies 2006 also states that the NPS will assume an aggressive role in promoting and pursuing measures to protect air quality-related values from the adverse impacts of air pollution. In cases of doubt as to the impacts of existing or potential air pollution on park resources, the NPS “will err on the side of protecting air quality and related values for future generations.” Impacts to environmental resources and values include visibility and biological resources (specifically ozone impacts on plants) that may be affected by airborne pollutants (ozone, nitrogen oxides, total hydrocarbons, particulate matter). Particulate matter and nitrogen oxide emissions are evaluated for visibility impairment. Volatile organic compounds and nitrogen oxides are precursors to the formation of ozone and are evaluated separately in lieu of ozone emissions.

Detailed air quality analyses required for traditional transportation development projects are not included in this Draft GMP/EIS. In order to advance transportation elements through final design and construction, the methodology for the air quality analysis would conform to methods and procedures contained in the FHWA *Federal Highway Program Manual (FHPM) 770* and in PennDOT’s *Project Level Air Quality Handbook*. Detailed evaluations of air quality impacts related to transportation infrastructure improvements would be performed when the projects are added to the regional TIP by the DVRPC.

This would include an analysis of pollutant emissions from proposed transportation system improvements. Traffic data would need to be reviewed in terms of study area vehicle miles of travel (VMT) and average travel speeds. Emission factors for CO, HC, and NO_x would be applied in order to calculate and compare bulk emissions associated with each improvement. Microscale analysis of CO also would be required to evaluate alternatives in relation to the National Ambient Air Quality Standards (NAAQS). When transportation elements identified in the Draft GMP/EIS are added to the TIP, these detailed evaluations would be performed.

To assess a general level of impact on air quality-related values from airborne pollutants, both the emissions of each pollutant related to the proposed activity and the background air quality must be evaluated then considered according to the thresholds defined below.

- Negligible:*** An action that would result in no increase or reductions in pollution levels when compared to the No-Action Alternative. Pollution levels would remain below the NAAQS. The results of such actions would have no noticeable effect on air quality.
- Minor:*** Minor impacts would result from actions with relatively small increases in pollution levels when compared to the No-Action Alternative. Pollution levels would remain below the NAAQS. The results of such actions would have no noticeable effect on air quality.
- Moderate:*** An action that would increase pollution levels by 10% or greater when compared to the No-Action Alternative. However, the total pollution levels would remain below the NAAQS. The results of such actions would have no noticeable effect on air quality.
- Major:*** An action that would increase pollution levels when compared to the No-Action Alternative and that would result in pollution levels that exceed the NAAQS. The results of such actions would have a substantial effect on air quality.

Impacts of Alternative A: No-Action

Alternative A would have local, short-term, minor, adverse and regional, long-term, minor, adverse impacts on air quality. Air quality is likely to degrade as a result of increased VMT in the Valley Forge area. As noted by DVRPC, growth in the number of vehicles and the amount of travel would outpace the rise in people and jobs. Based on the estimated population size in 2000, the number of residents would rise by about 9% by 2025, and vehicle ownership would increase by about 21%. At the end of this period there would be 62 cars for every 100 persons. Residents of the region would be driving more, so VMT per capita would rise by 21-24 miles a day. With more people, a larger percentage of people owning vehicles, and drivers traveling farther each day, the total miles driven on the region's highways would likely increase by more than 30%.

Impacts Related to Cultural Resource Management Actions

Cultural resource management actions for Alternative A would pose no impact to air quality.

Impacts Related to Natural Resource Management Actions

Natural resource management actions for Alternative A would pose no impact to air quality.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Public use, enjoyment, and experience actions under Alternative A would have long-term, minor, adverse impacts on air quality. Without improvements to the access roads and pedestrian/bicycle trails, air quality within the park would continue to degrade with an increase in traffic volume and congestion.

Impacts Related to Park Operations Actions

Park operations actions under Alternative A would have no impact on air quality.

Cumulative Impact

Several reasonably foreseeable transportation-related actions are planned in and around Valley Forge NHP that would contribute to the cumulative impact on local and regional air quality. Over the next 25 years, the RCC projects, the PA Route 23 improvements in Upper Merion Township, the widening of and new interchange on the PA Turnpike, and the SVM would involve changes to the physical landscape for almost 75% of the perimeter of the park. These projects would allow for increased traffic within the region, as well as minimize congestion/idling. While the details of these projects are being developed through the design process, it is likely that they would result in long-term, moderate, adverse impacts to the park's air quality; however, regional air quality changes would be undetectable.

These projects, along with Alternative A, would have a long-term, moderate, adverse cumulative impact on air quality. Alternative A would contribute an imperceptible, adverse increment to the cumulative impact.

Impacts of Alternative B

In general, impacts to air quality under Alternative B would be similar to the impacts of Alternative A, as the projected increase in traffic volumes would be the same.

Impacts Related to Cultural Resource Management Actions

The cultural resource management actions as specified in Alternative B would have localized, long-term, minor, beneficial impacts on air quality. Preservation of cultural resources may prohibit roadway improvements, thus limiting traffic volume increases in the vicinity of the park. This would also cause long-term, minor, adverse impacts in congested areas within the park and elsewhere in the region where vehicular trips are diverted to avoid cultural resources.

Impacts Related to Natural Resource Management Actions

Natural resource management actions as specified in Alternative B would have long-term, negligible, beneficial impacts on air quality.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Public use, enjoyment, and experience actions as specified in Alternative B would have localized, long-term, minor, beneficial impacts, as well as localized, long-term, minor adverse impacts on air quality.

Traffic calming measures on PA Routes 23 and 252 would reduce average travel speed, which could result in a negligible, beneficial impact to local air quality.

The removal of parking areas would have localized, short-term, minor, beneficial impacts to air quality; however, the use of remaining parking lots would be concentrated in specific areas, a localized, short-term, minor, adverse impact on air quality. This is due to an increased number of “cold starts” (an engine that’s been sitting for an hour or more pollutes more than a warm one) and idling vehicles in the remaining parking lots.

Proposed improvements to the trail network within the park would impact the operations and visitor experience at the park. Improved connections to the Schuylkill Valley Trail and the Chester Valley Trail would substantially improve accessibility to the park for bicyclists. It is anticipated that this would increase pedestrian and bicycle activity within the park, thus minimizing vehicular trips and beneficially impacting air quality.

Impacts Related to Park Operations Actions

Park operation actions as specified in Alternative B would have no impact on air quality.

Cumulative Impact

Present and reasonably foreseeable future actions that would contribute to the cumulative impact on air quality would be the same as those described under Alternative A. These projects, along with Alternative B, would have a long-term, moderate, adverse cumulative impact on air quality. Alternative B would contribute an imperceptible increment to the cumulative impact.

Impacts of Alternative C: NPS Preferred

It is anticipated that Alternative C would have localized, short-term and long-term, minor, adverse and beneficial impacts on air quality. Local air quality benefits would result from the substantial pedestrian/bicycle network in the region and the implementation of the ATS.

Impacts Related to Cultural Resource Management Actions

Actions and resulting impacts would be the same under Alternative C as described for Alternative B.

Impacts Related to Natural Resource Management Actions

Actions and resulting impacts would be the same under Alternative C as described for Alternative B.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Traffic calming measures on PA Routes 23 and 252 would reduce average travel speed, which could result in a negligible, beneficial impact to local air quality.

The removal of parking areas would have localized, short-term, minor, beneficial impacts to air quality; however, the use of remaining parking lots would be concentrated in specific areas, a localized, short-term, minor, adverse impact on air quality. This is due to an increased number of “cold starts” (an engine that’s been sitting for an hour or more pollutes more than a warm one) and idling vehicles in the remaining parking lots.

Proposed improvements to the trail network within the park would impact the operations and visitor experience at the park. Improved connections to the Schuylkill Valley Trail and the Chester Valley Trail would substantially improve accessibility to the park for bicyclists. It is anticipated that this would increase pedestrian and bicycle activity within the park, minimize vehicular visitor trips, and beneficially impact air quality.

Moderate air quality benefits would be realized through the implementation of a seasonal ATS in concert with seasonal closures of park roads. Minor, adverse air quality impact may occur if the ATS is unavailable out-of-season, as park visitors do not use the designated parking facilities at key stops within the park. This condition may result in unauthorized stops within the park along the roadway with extended idling periods for private vehicles. If the shuttle becomes a permanent, year-round service, then the NPS would determine if additional lots would be closed within the park. This would result in additional, localized, minor, beneficial and adverse impacts as described above.

The substantial change in traffic volume on PA Route 23 and Pawlings Road related to the improvements to the Pawlings Road corridor and construction of the US 422 ramps (as originally proposed by the *Phoenixville Area Intermodal Transportation Study*) would impact air quality. It is expected that local improvements on PA Route 23 would occur and some degradation would occur along the Pawlings Road corridor as a result of the increased traffic (see Section 4.7: Impacts to Transportation and Site Access). When the Pawlings Road project is added to the TIP, conformity analysis for air quality can be finalized.

Impacts Related to Park Operations Actions

Park operations actions would result in localized impacts associated with the relocation of the maintenance facility. The abandoned area would experience minor, beneficial improvements to air quality, while the new location would experience minor, adverse impacts to air quality.

Cumulative Impact

Present and reasonably foreseeable future actions that would contribute to the cumulative impact on air quality would be the same as those described under Alternative A. These projects, along with Alternative C, would have a long-term, moderate, adverse cumulative impact on air quality, as well as a long-term, moderate, beneficial cumulative impact. Alternative C would contribute a noticeable increment to the cumulative impact.

Conclusion

The overall impact to air quality under Alternative A would be long-term, minor, and adverse, and it would contribute an imperceptible, adverse increment to the long-term, moderate, adverse cumulative impact.

The overall impact to air quality under Alternative B would be long-term, minor, and beneficial, as well as long-term, minor, and adverse. Alternative B would contribute imperceptible increment to the long-term, moderate, adverse cumulative impact.

The overall impact to air quality under Alternative C would include short-term, minor, adverse and beneficial impacts. It would also include long-term, moderate, beneficial impacts, and long-term, minor, adverse impacts. Alternative C would contribute a noticeable increment to the long-term, moderate, adverse and long-term, moderate, beneficial cumulative impact.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified in relevant NPS planning documents as being of significance, Alternatives A, B, and C would not result in an impairment of park resources or values related to air quality.

4.4.9 Impacts to Soundscapes**Methodology**

NPS Management Policies 2006 state that the NPS will strive to preserve the natural quiet and natural sounds associated with the physical and biological resources of parks. NPS policy requires the restoration of degraded soundscapes to the natural condition whenever possible, and the protection of natural soundscapes from degradation due to noise (undesirable human-caused sound) (*Management Policies 2006*, section 4.9). The NPS is specifically directed to "take action to prevent or minimize all noise that, through frequency, magnitude, or duration, adversely affects the natural soundscape or other park resources or values, or that exceeds levels that have been identified as being acceptable to, or appropriate for, visitor uses at the sites being monitored" (*Management Policies 2006*, section 4.9).

Noise can adversely affect park resources by modifying or intruding upon the natural soundscape, and can also indirectly impact resources by interfering with sounds important for animal communication, navigation, mating, nurturing, predation, and foraging functions. Noise can also adversely impact park visitor experiences by intruding upon or disrupting experiences of solitude, serenity, tranquility, contemplation, or a completely natural or historical environment.

Regulations and Guidelines Related to Soundscapes

- Airport and Airway Development Act of 1970
- Airports In or Near National Parks Act
- The Federal Aviation Act of 1958
- National Air Tour Management Act of 2000
- National Parks Overflight Act
- The Redwood Act
- DO #47, "Soundscape Preservation and Noise Management"
- Wilderness Act of 1964

Context, time, and intensity together determine the level of impact for an activity. It is usually necessary to evaluate all three factors together to determine the level of noise impact. In some cases, an analysis of one or more factors may indicate an impact level, while an analysis of another factor may indicate a different impact level, according to the criteria below. In such cases, best professional judgment based on a documented rationale must be used to determine which impact level best applies to the situation being evaluated. The following factors were considered

- noise monitoring data that was acquired during the study for Improvements to PA Route 23 in Upper Merion Township and VFATPS (Summer of 2001 and March 2003) and was used to estimate the average decibel levels at key visitor areas throughout the park
- areas of use by visitors were identified in relation to where the activity is proposed; based on personal observation by park staff
- other considerations, such as topography and prevailing winds, were then used to identify areas where noise levels could be exacerbated or minimized
- the increases are typically related to the impact criteria of 66 dBA – 1 or 2 dBA can be significant if it puts you over 66 dBA

For the purposes of analyzing potential impacts to existing soundscapes within the park, the thresholds of change for the intensity of an impact are defined as follows.

Negligible: Natural sound environment would not be affected or the impacts would be at or below the level of detection, would be short-term, and the changes would be so slight that they would not be of any measurable or perceptible consequence to the visitor experience or to biological resources (0 to 1 dBA increase).

Minor: Impacts to the natural sound environment would be detectable, although the impacts would be short-term, localized, and would be small and of little consequence to the visitor experience or to biological resources. Mitigation measures, if needed to offset adverse impacts, would be simple and successful (2 to 3 dBA increase).

Moderate: Impacts to the natural sound environment would be readily detectable, long-term and localized, with consequences at the regional or population level. Mitigation measures, if needed to offset adverse impacts, would be extensive and likely successful. (4 to 5 dBA increase) and/or approaching 66 dBA.

Major: Impacts to the natural sound environment would be obvious, long-term, and would have substantial consequences to the visitor experience or to biological resources in the region. Extensive mitigation measures would be needed to offset any adverse impacts and their success would not be guaranteed (greater than 5 dBA increase or exceeding 66 dBA).

Impacts of Alternative A: No-Action

There are no actions that would substantially alter the acoustic environment in the park under the No-Action Alternative. Therefore, Alternative A would have negligible impacts on the existing soundscape.

Impacts Related to Cultural Resource Management Actions

Cultural resource management actions as specified in Alternative A would have negligible impacts on the existing soundscape.

Impacts Related to Natural Resource Management Actions

Natural resource management actions as specified in Alternative A would have negligible impacts on the existing soundscape.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Public use, enjoyment, and experience actions as specified in Alternative A would have negligible impacts on the existing soundscape.

Impacts Related to Park Operations Actions

Park operations actions as specified in Alternative A would have negligible impacts on the existing soundscape.

Cumulative Impact

Several reasonably foreseeable actions are planned in and around Valley Forge NHP that would contribute to the cumulative impact on soundscapes. Over the next 25 years, the RCC projects, the PA Route 23 improvements in Upper Merion Township, the widening of and new interchange on the PA Turnpike, and the SVM would involve changes to the physical landscape for almost 75% of the perimeter of the park. These projects would allow for increased traffic within the region, as well as minimize congestion/idling. After review of the noise measurements taken in 2001 and 2003, it appears that there would be imperceptible changes in the majority of the park, except adjacent to roadways and the rail line where there would be substantial changes in traffic volume over the next 25 years. In general, changes in noise levels from the current conditions to Design Year 2030 within the park are expected to be within 3 dBA of the current noise levels, which is currently defined as the limit of a minor impact. Detailed noise impact analyses and mitigation plans would be completed for each of the proposed transportation improvements near the park.

These projects, along with Alternative A, would have a long-term, minor, adverse cumulative impact on soundscapes. Alternative A would contribute an imperceptible increment to the cumulative impact.

Impacts of Alternative B

There are no actions that should substantially alter the acoustic environment in the park under this alternative. Implementation of the transportation elements and changes in the trail system may generate minor, site-specific changes to the current noise levels by increasing or decreasing visitor activity at certain locations within the park. Therefore, Alternative B would have long-term, minor, beneficial and adverse impacts on the acoustic environment.

Impacts Related to Cultural Resource Management Actions

Cultural resource management actions as specified in Alternative B would have negligible impacts on the acoustic environment.

Impacts Related to Natural Resource Management Actions

Natural resource management actions as specified in Alternative B would have negligible impacts on the acoustic environment.

Impacts Related to Public Use, Enjoyment, and Experience Actions

The visitor use and experience actions as specified in Alternative B would have minor, beneficial and adverse impacts on the acoustic environment. Implementation of traffic calming measures along PA Route 23 and PA Route 252 would result in lower vehicle running speeds and reduced tire noise emanating from vehicles. However, additional deceleration and acceleration of heavy vehicles at crosswalk/stop locations would generate localized noise increases, which would be difficult to mitigate. Detailed analyses are required to determine the aggregate effect at to the soundscape at these locations.

Proposed improvements to the trail network within the park would impact the operations and visitor experience at the park. Improved connections to the Schuylkill Valley Trail and the Chester Valley Trail would improve accessibility to the park for bicyclists and pedestrians. It is anticipated that this would increase pedestrian and bicycle activity within the park, minimize vehicular visitor trips and positively affect the acoustic environment.

Adjustments to parking areas should have a minor, site-specific, beneficial and adverse impact on the soundscape. There would likely be site-specific acoustic reductions where the parking areas are closed and minor, increases in noise levels at the new and expanded parking areas within the park. The greatest positive impact of the reduction would be at Washington's Headquarters. The new parking lots at Lord Sterling's Quarters off Yellow Springs Road and Walnut Hill on the north side of the river are related to proposed new activity centers.

Impacts Related to Park Operations Actions

Park operations actions as specified in Alternative B would have negligible impacts on the acoustic environment.

Cumulative Impact

Present and reasonably foreseeable future actions that would contribute to the cumulative impact on soundscapes would be the same as those described under Alternative A. These projects, along with Alternative B, would have a long-term, minor, adverse and long-term, minor, beneficial cumulative impact on soundscapes. Alternative B would contribute an imperceptible increment to the cumulative impact.

Impacts of Alternative C: NPS Preferred

It is anticipated that Alternative C would have minor, short-term and long-term, site-specific and local adverse and beneficial impacts on the park's soundscape. Local noise impact reductions would result from the substantial pedestrian/bicycle network in the region.

Also, the change in traffic volume on PA Route 23 and Pawlings Road the related to the improvements to the Pawlings Road Corridor and construction of the US 422 ramps would impact noise levels within proximity of each of these roadways. It is expected that local acoustic benefits on PA Route 23 would occur and some degradation would occur along the Pawlings Road corridor as a result of the increased traffic as described in Section 4.7: Transportation and Site Access.

Impacts Related to Cultural Resource Management Actions

Cultural resource management actions as specified in Alternative C would have negligible impacts on the soundscape.

Impacts Related to Natural Resource Management Actions

Natural resource management actions as specified in Alternative C would have negligible impacts on the soundscape.

Impacts Related to Public Use, Enjoyment, and Experience Actions

The visitor use and experience actions as specified in Alternative C would have minor beneficial and adverse impacts on the noise levels in the park.

Proposed improvements to the trail network within the park would impact the operations and visitor experience at the park. Improved connections to the Schuylkill Valley Trail and the Chester Valley Trail would substantially improve accessibility to the park for bicyclists. It is anticipated that this would increase pedestrian and bicycle activity within the park, minimize vehicular visitor trips and positively affect the soundscape.

Minor acoustic benefits would likely be realized through the implementation of an ATS in concert with seasonal closures of park roads. Traffic calming measures on PA Routes 23 and 252 and the resulting reduction in average speed would result in a minor decrease in the ambient noise level. Localized noise levels could increase, however, when larger vehicles decelerate and accelerate near the traffic calming measures.

The substantial change in traffic volume on PA Route 23 and Pawlings Road related to the improvements to the Pawlings Road Corridor and construction of the US 422 ramps (element 5) would impact the soundscape. It is expected that local improvements on PA Route 23 would occur and some degradation would occur along the Pawlings Road corridor as a result of the increased traffic as described in Section 4.7: Transportation and Site Access.

Impacts Related to Park Operations Actions

Park operations actions would result in site specific and local impacts associated with the relocation of the maintenance facility, including the vehicle service areas. Minor beneficial impacts would occur at the vacated facility, and minor adverse impacts would result at the new maintenance facility site.

Cumulative Impact

Present and reasonably foreseeable future actions that would contribute to the cumulative impact on soundscapes would be the same as those described under Alternative A. These projects, along with Alternative C, would have a long-term, minor, adverse and long-term, minor, beneficial cumulative impact on soundscapes. Alternative C would contribute a noticeable increment to the cumulative impact.

Conclusion

The overall impact to soundscapes under Alternative A would be negligible, and it would contribute an imperceptible increment to a long-term, minor, adverse cumulative impact.

The overall impact to soundscapes under Alternatives B and C would be long-term, minor, and beneficial, as well as long-term, minor, and adverse. Alternatives B and C would contribute imperceptible increments to the long-term, minor, beneficial and long-term, minor, adverse cumulative impact.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified in relevant NPS planning documents as being of significance, Alternatives A, B, and C would not result in an impairment of park resources or values related to soundscapes.

Regulations and Guidelines Related to Lightscapes

- Clean Air Act of 1977, as amended
 - Wilderness Act of 1964
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4.4.10 Impacts to Lightscapes

Methodology

The *NPS Interim Technical Guidance on Assessing Impacts and Impairment to Natural Resources* (NPS 2003b) defines lightscapes as, “a term encompassing the dark night sky, the experience of darkness, and the ecological importance of natural light cycles.” The NPS recognizes the importance of protecting natural lightscapes not only for visitor experience, but also for protection of ecological integrity.

The Clean Air Act also seeks to protect natural lightscapes by empowering NPS superintendents with the responsibility to protect visibility and all other air quality values from adverse impacts. Light pollution, like air pollution, is a trans-boundary process. Maintaining the primeval character of the wilderness is challenged by the constant visual impact of light pollution. Because of the radius of impact that outdoor lighting may have, projects outside of a wilderness area may still directly impact designated wilderness lands and therefore should be appropriately analyzed in accordance with wilderness guidelines (NPS 2000). Based on the fact that Valley Forge NHP is heavily affected by existing light sources outside park boundaries, the following intensity levels are based on changes to the existing lightscape. Impacts can be beneficial (i.e. removing existing impacts to lightscapes) or adverse (i.e., adding further lighting to already impacted or semi-impacted areas).

Negligible: Illumination levels are below what would alter biological processes or behavior. The change to the existing lightscape is virtually undetectable to wildlife or park visitors.

Minor: Illumination levels may be within the detectability of numerous species, but fundamental biological processes such as navigation, cover, and photosynthesis are unfiltered. Artificial lights may be noticed, but are quickly forgotten and do not affect the experience of a historic or cultural landscape, wilderness area, or other resources unique to a particular park. All visible lights are shielded or produce no glare to the observer, allowing full use of night vision.

Moderate: Illumination levels are detectable by numerous species, and biological processes are suspected of being altered. Artificial lights are frequently noticed and continue to intrude into the experience of other resources. The human eye never fully adapts to darkness due to ambient illumination or glare. Outdoor light fixtures are unshielded, too bright, or otherwise produce glare.

Major: Illumination levels are high enough to affect a range of species, resulting in suspected or documented stress and ecological disruption. Artificial lights are frequently noticed and continue to intrude into the experience of other resources. Numerous unshielded lights are visible, even at a distance, and produce enough glare that the human eye never fully adapts.

Impacts of Alternative A: No-Action

Impacts Related to Cultural Resource Management Actions

Cultural resource management actions would pose no new impact to the existing park lightscape.

Impacts Related to Natural Resource Management Actions

Natural resource management actions would pose no new impact the existing park lightscape. Lightscapes would be maintained as is and existing intrusions both inside and outside the park boundary, in particular the PA Turnpike rest area, would continue to intrude on the dark sky landscape. By proposing no changes, the overall impact to the park's lightscape would be long-term, moderate, and adverse.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Public use, enjoyment, and experience actions would pose no new impact to the existing park lightscape. Lighted vending machines, parking lots, facilities, and important cultural features would continue to intrude on the night sky landscape, a long-term, moderate, adverse impact.

Impacts Related to Park Operations Actions

Park operations actions would pose no impact to the existing park lightscape.

Cumulative Impact

Present and reasonably foreseeable future projects that could potentially contribute to the cumulative impact to existing lightscapes would include the RCC projects and the PA Turnpike widening. Both involve the addition or modification of roadways both adjacent to and within the park. The new roadways would introduce additional sources of artificial lighting in areas that are already; however, these projects offer the park an opportunity, through NPS-required mitigation, to offset and minimize these existing impacts. The park could work with PennDOT to establish vegetative buffers and recommend dark-sky fixtures.

If not properly mitigated, these projects, along with Alternative A, would result in a long-term, moderate, adverse cumulative impact to the existing lightscape. On the other hand, implementation of mitigation strategies would result in a long-term, moderate, beneficial cumulative impact. Alternative A would contribute noticeably to the cumulative impact.

Impacts of Alternative B

Impacts Related to Cultural Resource Management Actions

Cultural resource management actions would pose no impact to the park's existing lightscape.

Impacts Related to Natural Resource Management Actions

Under Alternative B, natural lightscapes within the park would be restored where possible, and existing dark-sky landscapes would be preserved. Using vegetative buffers in heavily impacted areas, dark-sky fixtures, and safety/security lighting only where necessary, would result in a long-term, moderate, beneficial impact to the lightscape.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Public use, enjoyment, and experience actions would result in long-term, minor, beneficial and adverse impacts to the park's existing lightscape. Within the Interpretive Focus Zone, new interpretive features may require additional artificial light sources for safety/security. These areas are currently unlit but impacted from external light pollution. In addition, little-used parking lots would be removed from within these areas as well. Existing artificial light sources would be removed, thus returning to a more naturalized condition.

Impacts Related to Park Operations Actions

Park operations actions would pose no impact to the existing park lightscape.

Cumulative Impact

Projects that would potentially contribute to cumulative impacts were described under Alternative A. These projects, along with Alternative B, would result in a long-term, moderate, beneficial or adverse (dependent on mitigation) cumulative impact to the existing lightscape. Alternative B would contribute noticeably to the cumulative impact.

Impacts of Alternative C: NPS Preferred

Impacts Related to Cultural Resource Management Actions

Cultural resource management actions would pose no impact to the park's existing lightscape.

Impacts Related to Natural Resource Management Actions

Impacts related to natural resource management actions would be the same under Alternative C as for Alternative B.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Impacts related to public use, enjoyment, and experience actions would be the same as those described for Alternative B.

Impacts Related to Park Operations Actions

Park operations actions would pose no impact to the existing park lightscape.

Cumulative Impact

Projects that would potentially contribute to cumulative impacts were described under Alternative A. These projects, along with Alternative C, would result in a long-term, moderate, beneficial or adverse (dependent on mitigation) cumulative impact to the existing lightscape. Alternative C would contribute noticeably to the cumulative impact.

Conclusion

The overall impact to lightscapes under Alternative A would be long-term, moderate, and adverse, and it would contribute noticeably to a long-term, moderate, adverse or beneficial (dependent on mitigation) cumulative impact.

Overall, Alternatives B and C would each result in a long-term, moderate, beneficial impact to existing lightscapes at Valley Forge NHP. They would each contribute noticeably to a long-term, moderate beneficial or adverse (dependent on mitigation) cumulative impact.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified in relevant NPS planning documents as being of significance, none of the alternatives (A, B, or C) would result in impairment of park resources or values related to lightscapes.

4.5 Impacts to Visitor Use and Experience

Methodology

NPS Management Policies 2006 states that the enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks and that the NPS is committed to providing appropriate, high-quality opportunities for visitors to enjoy the parks.

Part of the purpose of Valley Forge NHP is to offer opportunities for education, inspiration, and enjoyment. Consequently, one of the park's management goals is to ensure that visitors safely enjoy and are satisfied with the availability, accessibility, diversity, and quality of park facilities, services, and appropriate visitor experience opportunities.

Public scoping input and observation of visitation patterns combined with assessment of what is available to visitors under current management were used to estimate the impacts of the actions in the various alternatives in this document. The impact on the ability of the visitor to experience a full range of Valley Forge NHP resources was analyzed by examining resources and objectives presented in the park's significance statement. The potential for change in visitor use and experience proposed by the alternatives was evaluated by identifying projected increases or decreases in visitor uses, and determining whether or how these projected changes would affect the desired visitor experience and to what degree and for how long.

Negligible: Visitors would not be affected or changes in visitor use and/or experience would be below or at the level of detection. Any impact would be short-term. The visitor would not likely be aware of the impacts associated with the alternative.

Minor: Changes in visitor use and/or experience would be detectable, although the changes would be slight and likely short-term. The visitor would be aware of the impacts associated with the alternative, but the impacts would be slight.

Moderate: Changes in visitor use and/or experience would be readily apparent and likely long-term. The visitor would be aware of the impacts associated with the alternative and would likely be able to express an opinion about the changes.

Major: Changes in visitor use and/or experience would be readily apparent, severely adverse or exceptionally beneficial, and have important long-term consequences. The visitor would be aware of the impacts associated with the alternative and would likely express a strong opinion about the changes.

Impacts of Alternative A: No-Action

Under the No-Action Alternative, the visitor experience would remain unchanged. The principal interpretive focus would be the story of the Revolutionary War soldier. There would be no new museum or interpretive facility. No new visitor programs would be added. The level of visitation to the park from those interested primarily in history would remain at current levels. The number of visitors who come for a recreation experience would increase slightly, in response to area population growth and an improved regional trail system.

Impacts Related to Cultural Resource Management Actions

Cultural resource management actions would remain unchanged. The inability to properly maintain the cultural landscape, historic buildings, and the collections would continue to detract from the visitor experience, producing a long-term, moderate, adverse impact to the visitor experience.

Impacts Related to Natural Resource Management Actions

Under Alternative A, management of the park's natural resources would be continue to be minimal. Issues related to invasive plants and forest regeneration would not be addressed. Continued loss of habitat would have a long-term, moderate, adverse impact on the visitor experience because of degradation of the natural setting of the park.

Impacts Related to Public Use, Enjoyment, and Experience Actions

The existing Welcome Center would continue to serve as the principal interpretive facility. There would continue to be no interpretation of the park's landscape, Revolutionary War themes, or natural resources. If staffing declines for budgetary reasons, the breadth and availability of interpretive programming would decline. No new trails would be developed, and the linkage with the regional trail system would not be completed. No new educational services would be provided and the number of school groups that visit would remain low as compared to the school-age population of the region. These actions would result in a long-term, moderate, adverse impact to the visitor experience.

Total current visitation is estimated at 1.1 million annual visitors. Of this number, some 350,000 come primarily to enjoy the park's interpretive experiences. Under Alternative A, this number is expected to remain at current levels or decline.

Most visitors to the park are "recreational" visitors. Although this group enjoys the historical resources of the park, their visit is motivated primarily by recreational use of the park's open space and trails. The current number of recreational visitors is estimated to be 750,000. Under Alternative A, this number would increase slightly to 850,000 based on increased population growth in the region.

No interpretive programs would be offered on natural resources or their relationship to history and cultural resources and to the park's mission, resulting in a continuing lack of visitor understanding.

The visitor length of stay would remain consistent. Visitors interested in history would continue to spend an average of 2.0 to 2.5 hours in the park; and recreational visitors would continue to spend an average of 1.0 to 2.0 hours in the park.

The impact of management actions associated with the visitor experience under Alternative A would be long-term, moderate, and adverse.

Alternative A envisions no new measures to manage the park's traffic congestion. No park roads would be closed, and no alternative visitor transportation would be provided. A new entrance would be developed in conjunction with relocation of PA Route 23, but action would not be taken to create a true park gateway. The park's trail system would not be further connected to the regional trail system. Under Alternative A, visitors would continue to endure the congestive and traffic conflicts that characterize the current visitor experience. The continued presence of high numbers of vehicles, and their effects on other users and on quiet would pose a long-term, moderate, adverse impact to the visitor experience. The impact of Alternative A would be long term, moderate, and adverse.

Impacts Related to Park Operations Actions

Under the No-Action Alternative, it is anticipated that budgetary resources available to the park would not significantly increase. The inability to properly maintain the interpretative landscape and historic structures could also detract from the quality of the visitor experience, producing a long-term, moderate adverse impact.

Cumulative Impact

Construction of the RCC projects and the PA Turnpike widening would cause short-term, major, adverse impacts to the visitor experience as added congestion and detours through the park occur. Implementation of the SVM with a potential station for visitors in the park would result in a long-term, major, beneficial impact to the visitor experience due to greatly enhanced accessibility. Remediation of the ARS and the resulting reopening of 75 acres of park land to the public would cause a long-term, major, beneficial impact to the visitor experience. Implementation of the Valley Creek Restoration Plan and the Valley Creek Stormwater Management Plan in the watershed upstream of the park would help to preserve resources such as Washington's Headquarters and the covered bridge, and would enhance opportunities for anglers. This would produce a long-term, major, beneficial impact to the visitor experience.

These projects, along with Alternative A, would result in a minor, long-term, beneficial cumulative impact to visitor use and experience, with Alternative A contributing noticeable, adverse increments to the cumulative impact.

Impacts of Alternative B

Alternative B would allow visitors to experience the park on their own terms. Under this alternative, there would be no American Revolution Center. An expanded Welcome Center would be the primary interpretive facility. Enhanced interpretation of a select number of other buildings and sites also are envisioned under this alternative.

Impacts Related to Cultural Resource Management Actions

Better care of historic structures and landscapes and more accessible display of collections would enable the visitor to see more and learn more about the park and the associated historical events. Alternative B would have a long-term, moderate, beneficial impact on the visitor experience.

Impacts Related to Natural Resource Management Actions

Active management of natural resources, resulting in healthy habitats, would enhance the overall visitor experience, and thus would have a long-term, major, beneficial impact on the visitor experience.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Enhanced interpretation at key historic sites, enhanced access to the collections, and the provision of interpretive services for recreational visitors, would have a long-term, major, beneficial impact on the visitor experience. Enhanced educational services and programs would attract many more school groups and provide more satisfactory learning experiences, a long-term, major, beneficial impact.

All road circulation would remain as is. No ATS would be provided. The continued presence of high numbers of vehicles, and their effects on other users and on quiet would pose a long-term, moderate, adverse impact to the visitor experience.

Completion of the park trail system and additional links to the regional system would have a long-term, major, beneficial impact on the visitor experience.

Attendance for Alternative B is projected to increase by a modest amount over the No-Action Alternative. History visitors would respond to the enhancements to the interpretive experience described above, with an increase of 10 percent or 35,000 visitors over Alternative A. Recreational visitation is expected to rise by 200,000, due to population growth, enhanced visitor services for recreationalists, and the completed trail system. A summary of projected park visitation for all the alternatives can be found in Appendix J.

The length of stay of history visitors would remain at 2.0 to 2.5 hours, and the length of stay for recreation visitors would rise by 0.5 hours over Alternative A.

The proposed actions under Alternative B would have a long term, moderate and beneficial impact.

Traffic calming on public roads would have a long-term, major, beneficial impact on the visitor experience as it helps to reduce speeding and make pedestrian crossings easier. No park roads would be closed and no ATS would be provided. The removal of four little-use parking lots would have a long-term, negligible, adverse impact on the convenience of a few visitors. The continued presence of high numbers of vehicles, and their effects on other users and on quiet would pose a long-term, moderate, adverse impact to the visitor experience.

Impacts Related to Park Operations Actions

Payment of a fee by all park visitors would be initially unpopular, yet would provide funding for reinvestment in enhancing the visitor experience, and the adverse and beneficial impacts therefore balance out.

Reorganization of park staff, more strategic use of partnerships and volunteers, and the availability of new revenues would enable better resource protection and enhanced visitor services and experiences, resulting in a long-term, major, beneficial impact to the visitor experience.

Visitor Spending under Alternative B is expected to increase in proportion to the increase in history visitors. Thus, the \$800,000 in sales recorded at the Welcome Center should increase by 10% to a total sales level of \$880,000.

Cumulative Impact

Present and reasonably foreseeable future actions that would contribute to the cumulative impact are described under Alternative A. These projects, along with Alternative B, would result in a moderate, long-term, beneficial cumulative impact to visitor use and experience, with Alternative B contributing noticeable increments.

Impacts of Alternative C: NPS Preferred

Impacts Related to Cultural Resource Management Actions

Better care of historic structures, landscapes, and collections would enable the visitor to see more and learn more about the park and the associated historical events. Cultural resource management actions under Alternative C would have a long-term, moderate, beneficial impact on the visitor experience.

Impacts Related to Natural Resource Management Actions

Impacts related to natural resource management actions would be the same under Alternative C and for Alternative B.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Increased and enhanced interpretive programming park-wide also would result in a long-term, major, beneficial impact to the visitor experience in the park.

The closure of park tour roads to vehicles would result in a more quiet and contemplative environment. Use of the park roads for bicycling would reduce conflicts between bikers and pedestrians on the multi-purpose trail. Both actions would result in a long-term, major, beneficial impact to the visitor experience in the park.

The substitution of a visitor shuttle for uncontrolled vehicular access would cause changes in visitor patterns of use. Some visitors would miss the convenience of driving their own vehicles to precisely the point they wish to go; others would appreciate the expanded recreational opportunities and the reduction of noise and conflicts.

The level of visitation would increase slightly (Appendix J). In addition, the expanded outdoor interpretive experience park-wide would attract additional history visitors who would go to these venues.

For a short period of time following closure of park roads, recreational visitation might be slightly depressed; however, the additional recreational opportunities within the park, completed links to regional trails, and access to new interpretive opportunities should result in an overall increase in recreational use. Under Alternative C, this growth should be twice the level anticipated for Alternative A, bringing total recreational visitation to 950,000. A full breakdown of visitation projections can be found in Table J-1 in Appendix J.

Traffic calming on public roads would have a long-term, major, beneficial impact on the visitor experience as it helps to reduce speeding and make pedestrian crossings easier. The closure of Gulph Road and park tour roads and the removal of parking

lots from the interior of the park would and the use of a visitor shuttle would be less convenient for visitors but would eliminate traffic conflicts, create a quieter, more contemplative environment and allow more recreational opportunities.

Impacts Related to Park Operations Actions

Payment of a fee by all park visitors would be initially unpopular, yet would provide funding for reinvestment in enhancing the visitor experience, and the adverse and beneficial impacts therefore balance out.

Reorganization of park staff, more strategic use of partnerships and volunteers, and the availability of new revenues would enable better resource protection and enhanced visitor services and experiences, resulting in a long-term, major, beneficial impact to the visitor experience.

Cumulative Impact

Present and reasonably foreseeable future actions that would contribute to the cumulative impact are described under Alternative A. These projects, along with Alternative C, would result in a major, long-term, beneficial cumulative impact to visitor use and experience, with Alternative C contributing appreciable increments.

Conclusion

The overall impact to the visitor experience under Alternative A would be moderate and adverse. The nature and quality of the visitor experience, which is another way of describing what and how visitors learn, would be diminished as visitor services and resource protection decline. Alternative A would contribute noticeable, adverse increments to a minor, long-term, beneficial cumulative impact to visitor use and experience.

The overall impact to the visitor experience under Alternative B would be moderate and generally beneficial over the long term. Actions to manage the cultural resources, natural resources and transportation infrastructure of the park, as well as enhanced interpretation, would improve the quality of people's time in the park and their ability to learn the history lessons of the park. Alternative B would contribute noticeably to the moderate, long-term, beneficial cumulative impact.

The overall impact to the visitor experience under Alternative C would be major and beneficial in the long term. The nature and quality of the visitor experience would be greatly enhanced and the park's ability to attract and hold visitors would be strengthened. Alternative C would contribute appreciably to the major, long-term, beneficial cumulative impact.

4.6 Impacts to Socioeconomic Environment

Methodology

The impact of proposed alternatives on the regional economy are created by visitor expenditures, both within the park and outside the park boundaries, through the NPS management and operation of the park- principally employment and regional non-labor expenditures. For the analysis, a number of sources were used to estimate all on-site and off-site expenditures. These include *Sustainability Review of Museum Programs*, NPS staffing plans and budgets, and data on visitor expenditures

prepared by the commonwealth of Pennsylvania and others. Based on the magnitude of employment and expenditures, impacts were categorized as follows.

- Negligible:*** The impact on the regional and local economy would be immeasurable.
- Minor:*** The impact would affect only a small sector of the economy and would require effort to measure. The consequences of such actions would not be readily apparent.
- Moderate:*** The impact would be clearly measurable and affect either a small or large sector of the local or regional economy. Adverse impacts would not prove significant enough to threaten any economic sector and beneficial impacts would not result in noticeable structural shifts.
- Major:*** Impact would be readily apparent and cause appreciable shifts in the regional and local economy, either adverse or beneficial.

Impacts of Alternative A: No-Action

Under Alternative A, management of the park’s cultural and natural resources, and nature of the visitor experience would remain unchanged. The number of visitors coming to the park whose primary trip purpose was “history” would remain at the current level. The number of recreational visitors would increase slightly in response to population growth and continued development of the regional trail system.

Impacts Related to Cultural Resource Management Actions

Management of the park’s cultural resources would remain unchanged. If the park’s operating budget continues to stay flat, staffing and expenditures related to cultural resource management could decline. However the magnitude of any impact in the context of the regional economy would be negligible.

Impacts Related to Natural Resource Management Actions

Management of the park’s natural resources would remain unchanged. If the park’s operating budget continues to stay flat, staffing and expenditures related to natural resource management could decline. However the magnitude of any impact in the context of the regional economy would be negligible.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Under Alternative A, an increase in recreational visitation of some 100,000 visits is expected. Most of these visits would be made by local residents whose spending power is already part of the regional economy, so the impact is negligible. Current history visitors spend approximately \$28 million in the regional economy. (This number is broken down into \$9 million from daytrip visitors and \$19 million from overnight visitors.) There would be no change in the number of history visitors so the impact of visitor spending also would be negligible.

No changes are proposed to traffic management within the park, and no roads would be closed. Continued traffic congestion could have a cost in terms of increasing commuting times, which would result in a long-term, minor adverse impact to the regional economy.

Impacts Related to Park Operations Actions

Under Alternative A, it is expected that the park's operating budget would continue to stay flat, which could result in reductions in staffing as well as reductions in non-labor expenditures in the regional economy. In the context of the regional economy, any impacts resulting from park operations would be negligible.

Cumulative Impact

Construction of the RCC projects and the PA Turnpike widening would cause long-term, moderate, beneficial impacts to the regional economy as congestion and travel times are reduced. Implementation of the SVM would result in a long-term, moderate, beneficial impact to the regional economy due to greatly enhanced accessibility. Remediation of the ARS could cause a short-term, minor, beneficial impact to the regional economy due to the expenditure of clean-up funds. Implementation of the Valley Creek Restoration Plan and the Valley Creek Stormwater Management Plan in the watershed upstream of the park would reduce the occurrence and impacts of flooding in the watershed, which would pose a long-term, minor, beneficial impact to the regional economy. Implementation of these plans also would enhance opportunities for anglers, producing a long-term, negligible, beneficial impact to the regional economy.

These projects, along with Alternative A, would result in a long-term, moderate, beneficial cumulative impact to socioeconomic resources, with Alternative A contributing an imperceptible increment to the cumulative impact.

Impacts of Alternative B

Under Alternative B, the park's cultural and natural resources would be actively managed. Interpretive programming and activities would be enhanced. The number of visitors coming to the park whose primary trip purpose was "history" would increase slightly and the number of recreational visitors would increase in response to population growth and increased links to the regional trail system.

Impacts Related to Cultural Resource Management Actions

Better management of cultural resources would require expenditures by the park, its partners, and others. These investments would have a short-term, negligible, beneficial impact in the context of the regional economy. The attraction of additional visitors and the expenditures they make would have a long-term, negligible, beneficial impact to the regional economy.

Impacts Related to Natural Resource Management Actions

Active management of the park's natural resources would require expenditures by the park, its partners, and others. These investments would have a short-term, negligible, beneficial impact in the context of the regional economy. The attraction of additional visitors and the expenditures they make would have a long-term, negligible, beneficial impact to the regional economy.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Offsite spending by visitors would increase by \$2.8 million over Alternative A to \$30.9 million, as shown in Table 5. Increases in spending would be due primarily to the additional 35,000 history visitors over Alternative A. Day trip visitor spending would increase from \$9 million in Alternative A to \$9.9 million in Alternative B. The largest day trip visitor spending would be for food, at \$4 million.

Overnight visitor spending would increase by almost \$2 million over Alternative A, to \$20.9 million. In the context of the regional economy, the increases would be long-term, negligible, and beneficial. A detailed list of off-site expenditures for Alternative B is found in Appendix J.

No changes are proposed to public or park roads. There would be no impact to the regional economy due to transportation and site access actions.

Impacts Related to Park Operations Actions

Management actions proposed under Alternative B would require additional park staff and expenditures. Given the minimal level of increase, the impact on the regional economy would be long-term, negligible, and beneficial.

Cumulative Impact

The cumulative impact and the contribution to the cumulative impact would be the same as identified for Alternative A.

Impacts of Alternative C: NPS Preferred

Impacts Related to Cultural Resource Management Actions

Actions and resulting impacts related to cultural resources management actions would be the same as those described for Alternative B.

Impacts Related to Natural Resource Management Actions

Actions and resulting impacts related to natural resources management actions would be the same as those described for Alternative B.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Actions and resulting impacts related to public use, enjoyment, and experience actions would be the same as those described for Alternative B.

Impacts Related to Park Operations

Actions and resulting impacts related to park operations actions would be the same as those described for Alternative B.

Cumulative Impact

The cumulative impact and the contribution to the cumulative impact would be the same as identified for Alternative A.

Conclusion

There would be a long-term, negligible beneficial impact on socioeconomic resources from actions proposed by Alternative A, while Alternatives B and C would result in a long-term, negligible to minor, beneficial impact on the regional economy from actions proposed by Alternatives B and C.

Alternatives A, B, and C would contribute an imperceptible increment to the long-term, moderate, beneficial cumulative impact to socioeconomic resources.

4.7 Impacts to Transportation and Site Access

Providing safe and adequate access to Valley Forge NHP for park visitors is critical to the future success of the park. Management of the flow of people through the park is directly related to visitor experience (positive and negative) and resource preservation.

Methodology

The purpose of park roads is to enhance visitor experience while providing safe and efficient accommodation of park visitors. However, suburban arterial roadways have a dual function, and not only serve park purposes, but also serve as extensions of the local transportation network and carry large volumes of non-park related traffic (NPS 1984).

Valley Forge NHP worked with the DVRPC, PennDOT, and the FHWA to identify transportation improvement projects in and around the park to protect park resources and the visitor experience while improving mobility for the traveling public in Chester and Montgomery Counties.

These agencies formed a Steering Committee to participate in a transportation alternative evaluation consistent with the alternative development process outlined in PennDOT Publication 278 (*The Transportation Project Development Process – Environmental Impact Statement Handbook*). The intent was to use the GMP/EIS process to involve the park and the public in surrounding municipalities and counties in planning initiatives for future transportation infrastructure improvements. The goal was to minimize redundancy and increase effectiveness in transportation planning activities among the federal, state and local agencies involved in making transportation planning decisions.

Based on the recommendations from the VFATPS and resulting transportation Programmatic Agreement completed in 2002, the Steering Committee identified a range of transportation improvements that were analyzed to determine whether they met the park's purpose and mission, as well as their effectiveness in moving the traveling public through the Valley Forge area.

As stated in the Programmatic Agreement, “the FHWA will work with NPS to evaluate the scope and appropriate NEPA class of action, NHPA and Section 4(f) documentation for the relocation alternatives (P-Options) as recommended in the VFATPS....” Through this GMP/EIS process, the NPS and FHWA are initiating early coordination with the public, local governments and environmental review agencies to develop transportation projects that will have the public and financial support of all parties required to initiate project development activities for the recommended projects. None of these transportation elements are listed on Pennsylvania's current TIP, the prioritized list of transportation improvements as agreed by all relevant jurisdictions. Competition for TIP listing would be a next step.

The proposed SVM, currently being evaluated in a separate environmental impact statement, may also reduce Design Year 2030 No-Action traffic volumes by 1% to 2% in the Valley Forge area. To provide a conservative estimate of potential impact

on the park, this potential relief is not reflected in this traffic volume analysis, however. This long-term transit improvement program has an added potential benefit in that there may be an opportunity for off-peak period stops in the park to provide additional service beyond the current Route 125 bus line, which serves the park. Support for these initiatives is common to all of the GMP/EIS alternatives.

The NPS selected the transportation elements that are included in the two action alternatives (B and C) based on the information available to date.

The impact level of intensity for improvements to transportation infrastructure relate to both physical and operational impacts associated with a specific action. For purposes of this analysis, it is assumed that the physical impacts are relatively minor and that minimization and mitigation of impacts would be fully implemented as transportation projects are programmed in later design phases. In general, the study to date has revealed that, with the exception of the signalized intersections in the project area, the proposed transportation elements identified in this study do not create the need for substantial traffic capacity-adding improvements to the existing arterial roadway network (see Figure 3-8).

The operational impacts of an action relate to many factors, including the functional classification of a facility, roadway geometry (horizontal and vertical), and traffic volume. Measures of traffic congestion involve LOS analysis, field measured time runs, observations of traffic operations, and evaluation of current and future traffic volumes.

For purposes of this evaluation, however, comparison of traffic volumes on the major and minor arterial roadways in the study area is key to characterizing the level of impact for this project. The evaluation is based on review of the overall roadway network when comparing the transportation elements of the proposed action alternatives with Alternative A. The following parameters were used to identify the level of intensity for the transportation elements in this analysis.

Negligible: Changes to circulation and site access would be at the lowest levels of detection and would have an imperceptible impact on vehicular traffic flow. For purposes of this analysis for the action alternatives, changes would be less than a 5% increase over Design Year 2030 No-Action AADTs.

Minor: The change to circulation and access would be detectable but would be of a magnitude that would not have an appreciable impact on vehicular traffic flow. Traffic volume increases would be between 5% and 10% over Design Year 2030 No-Action AADTs.

Moderate: The impacts would be readily apparent and would result in a substantial change in circulation patterns, congestion, and/or site accessibility in a manner noticeable to the public. Traffic volume increases are anticipated between 10% and 25% over Design Year 2030 No-Action AADTs.

Major: The impacts would be readily apparent and would result in a substantial change in circulation in a manner noticeable to the public and be markedly different from the present circulation patterns and site accessibility. Traffic volume increases that are greater than 25% over Design Year 2030 No-Action AADTs would be substantial.

Alternative A is compared to the current volumes and is the basis for identification of the cumulative impacts when considering all planned and programmed projects in the study area.

Impacts of Alternative A: No-Action

This alternative would result in site-specific and local, major adverse impacts on transportation and site access. The No-Action traffic volumes on these roads would increase over current volumes due to population and employment projections, new development, including construction of the RCC projects, and other already-programmed transportation improvements in the region (including the widening of the PA Turnpike to six lanes between Downingtown and Valley Forge and Improvements to PA Route 23 east of US 422 in Upper Merion Township). Because the closure of County Line Road, currently a state highway (SR 3022), is mitigation for the Betzwood Bridge Replacement Project, it is considered to be an existing condition.

Impacts Related to Cultural Resource Management Actions

Cultural resource management policies and actions would have major, adverse, local and regional impacts on the traffic and transportation network. The mandate to preserve cultural resources, including archeological resources, restricts the potential for undertaking capacity-adding projects to accommodate the increased AADT traffic volume as projected by DVRPC.

Impacts Related to Natural Resource Management Actions

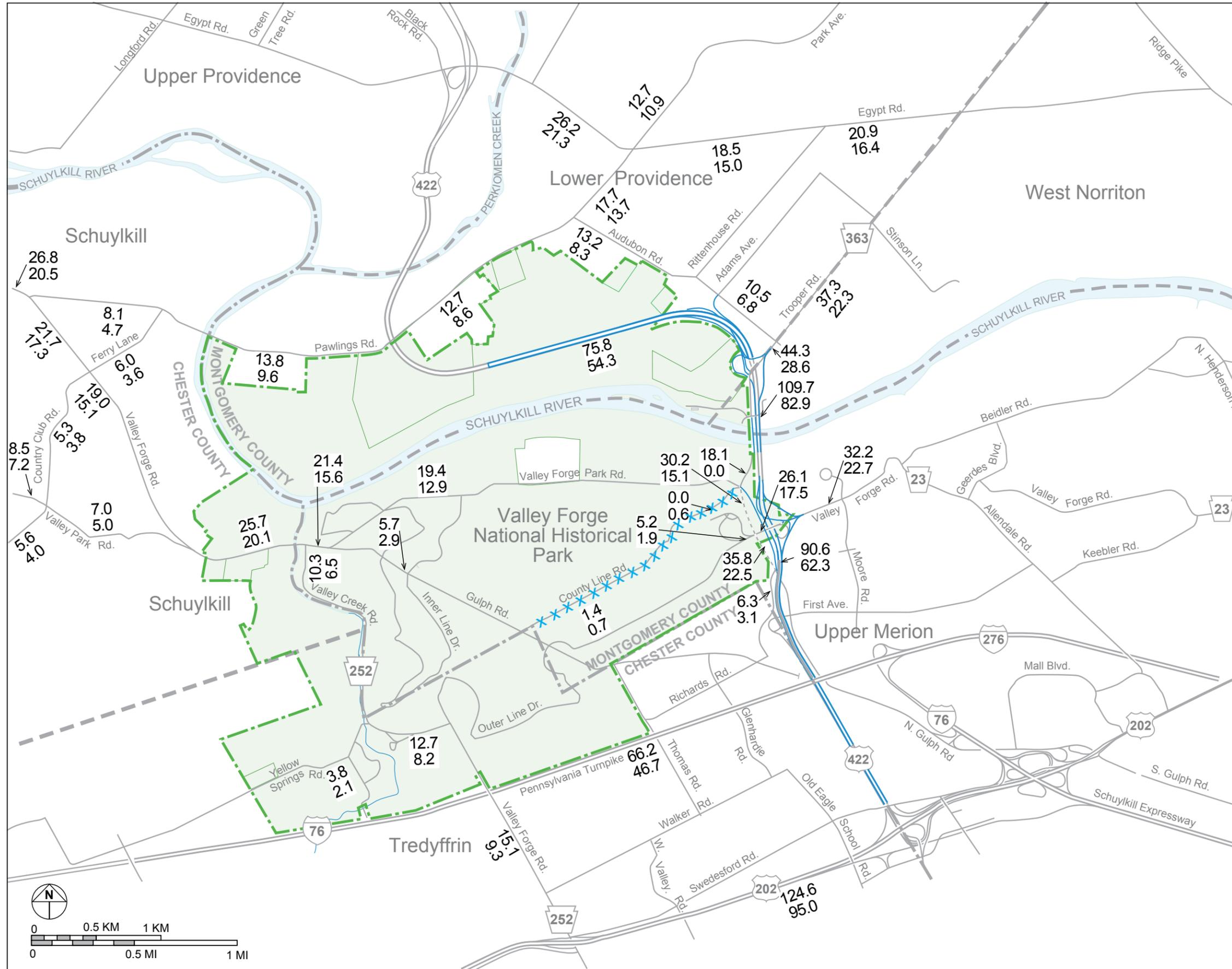
Natural resource management policies would have major adverse, local and regional impacts on the on the traffic and transportation network. The presence of natural resources limits the potential to accommodate the increased AADT traffic volume. The large population of deer in and around the park continues the potential for conflicts with vehicular traffic.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Continued use of the existing roadway network would have major, adverse, site-specific, local and regional impacts on the traffic and transportation network. The No-Action Alternative would see substantial traffic volume increases on the state highways within the park. Table 4-1 and Figure 4-1 identify the increases on the roadways within the park as compared to current volumes. (Additional information is available in the Technical Support Data for traffic volumes on other roadways around Valley Forge NHP for the Design Year 2030.)

Traffic volumes on PA Route 23 within the park would range from 19,400 to 30,200 in the Design Year 2030 (an increase of 28% to 100% over the current volumes). The 100% increase on PA Route 23 between Old Betzwood Bridge and Outer Line Drive reflects the introduction of the replacement Betzwood Bridge and the increased capacity of the relocated North Gulph Road as part of the RCC projects. It should be noted that the park-related impacts of these traffic increases would be diminished by the relocation of North Gulph Road as part of the RCC projects.

Increases on PA Route 252 would range from 55% to 62% over current volumes (6,500 to 9,300 vehicles per day) in the No-Action Alternative. Daily traffic volumes on Gulph Road would increase from 2,900 to 5,700. Daily traffic volumes on Outer Line Drive would increase between 1,400 and 5,200 vehicles per day. This additional volume (about 1,620 trips daily) is well within the capacity of these existing roadways.



- Park Boundary
- Inholdings
- Independent Projects (in the River Crossing Complex)
- xxxxx County Line Road Closed to Public Use

30.2 Year 2030 Alternatives A and B Volumes
 15.1 Current Traffic Volumes

Data Source: Delaware Valley Regional Planning Commission

Transportation Improvements Assumed in Alternative A

- Independent projects in the River Crossing Complex:
 - Betzwood Bridge Replacement
 - PA 23/US 422 Interchange Modernization
 - New PA 363/US 422 full movement interchange with US 422 widening (from US 202 through PA 363 interchange) and new US 422 bridge over Schuylkill River
- Closure of County Line Road in park
- Ongoing advance of transit and non-auto access opportunities

Principal Roadway Elements Included in Alternative B

- Transportation conditions in Alternative A
- Traffic calming and TSM measures for PA 23 and PA 252 in the park



Figure 4-1
 Future Traffic Volumes
 Average Annual Daily Traffic (AADT) (in thousands)
 Present Volumes vs. Year 2030 Alternatives A and B

Source: Boles, Smyth Associates, Inc.

Table 4-1 Current, Design Year 2030 No-Action, and Alternative B Average Annual Daily Traffic Volumes

Road	From	To	Current Traffic Counts (2002)	2030 No-Action and Alternative B Traffic Volumes	Percent Increase over Current Volumes
PA Route 23	Pawlings Rd	Ferry Lane	17,300	21,700	25%
PA Route 23	Ferry Lane	Valley Park Rd	15,100	19,000	26%
PA Route 23	Valley Park Rd	PA Route 252	20,100	25,700	28%
PA Route 23	PA Route 252	Gulph Rd	15,600	21,400	37%
PA Route 23	Gulph Rd	Old Betzwood Bridge	12,900	19,400	50%
PA Route 23	Old Betzwood Bridge	Outer Line Dr	15,100	30,200	100%
PA Route 23	N. Gulph Rd	West of US 422	17,500	26,100	49%
PA Route 23	East of US 422	Moore Rd	22,700	32,200	42%
PA Route 252	PA Route 23	Yellow Springs Rd	6,500	10,300	58%
PA Route 252	Yellow Springs Rd	PA Turnpike (I-76)	8,200	12,700	55%
PA Route 252	PA Turnpike (I-76)	Walker Rd	9,300	15,100	62%
Pawlings Rd	PA Route 23	Ferry Lane	4,700	8,100	72%
Pawlings Rd	Ferry Lane	US 422	9,600	13,800	44%
Pawlings Rd	US 422	Audubon Rd	8,600	12,700	48%
Pawlings Rd	Audubon Rd	Egypt Rd	13,700	17,700	29%
Gulph Rd	PA Route 23	County Line Rd	2,900	5,700	97%
Outer Line Dr	Visitor's Center	Gulph Rd	700	1,400	100%
Outer Line Dr	Visitor's Center	PA Route 23	1,900	5,200	174%

Source: DVRPC, 2005

The existing transportation facilities around the park would also experience traffic volume increases over the current conditions in 2030. The AADT on Pawlings Road between PA Route 23 and Egypt Road would range from 8,100 to 17,700 in the No-Action Alternative. Increases on this stretch of Pawlings Road range from 29% to 72%.

Impacts Related to Park Operations Actions

Park operations actions would have negligible impacts on transportation and site access.

Cumulative Impact

The projects considered in the cumulative impact evaluation include construction of the RCC projects, and other already-programmed transportation improvements in the region, such as the widening of the PA Turnpike to six lanes between Downingtown and Valley Forge, and improvements to PA Route 23 east of US 422 in Upper Merion Township. As previously noted the proposed SVM may also reduce Design Year 2030 No-Action traffic volumes by 1% to 2% in the Valley Forge area.

These projects, along with Alternative A, would result in a long-term, major, adverse cumulative impact to transportation and site access, with Alternative A contributing an appreciable, adverse increment to the cumulative impact.

Impacts of Alternative B

Implementation of the transportation elements proposed under this alternative and changes in the trail system would generate minor, site-specific and local changes to the flow of pedestrians, bicyclists and motor vehicles by increasing or decreasing visitor activity at certain locations within the park. Therefore, Alternative B would have minor, beneficial and adverse impacts on the transportation and site access issues for the park when compared to Alternative A. Traffic volume changes outside the park are expected to be negligible.

Impacts Related to Cultural Resource Management Actions

Cultural resource management policies and actions would have major, adverse, local and regional impacts on the traffic and transportation network. The mandate to preserve cultural resources, including archeological resources, restricts the potential for undertaking capacity-adding projects to accommodate the increased AADT traffic volume as projected by DVRPC.

Impacts Related to Natural Resource Management Actions

Natural resource management actions, as well as actions specified in Alternative B, would have minor, long-term beneficial and adverse impacts transportation and site access. Development and implementation of a deer management plan would reduce the potential for conflicts with vehicular traffic in and around the park. As with Alternative A, the mandate to preserve natural resources restricts the potential for undertaking capacity-adding projects to improve traffic flow.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Alternative B would result in site-specific and local, minor beneficial and adverse impacts on transportation and site access. Alternative B includes Traffic Calming/Traffic Systems Management on PA Route 23 and PA Route 252 within the park (see Figure 2-11).

Safety is the critical issue related to developing an effective improvement program. One key location is the intersection of PA Route 23 and PA Route 252. These improvements would include enhanced pedestrian and bicycle access through the intersection.

Other improvements are focused in the active Varnum's Quarters/Washington Memorial Chapel area (23 Zone B), where the primary pedestrian crossing of PA Route 23 is located, but the driveway intersections are not aligned. These improvements include traffic calming devices, formalized pedestrian crossings and greater parking utilization. Enhanced advanced signing to warn drivers of the heightened pedestrian activity would be added as an important safety feature.

The proposed transportation elements include improvements to sight distance and sign visibility. The use of textured pavement treatments would heighten driver awareness. Traffic calming would reduce travel speeds within the park, but would not reduce traffic volume unless there were a substantial diversion of traffic from PA Route 23 and PA Route 252, which is not proposed under Alternative B. More detailed investigations would be required as the design development activities

progress for these elements. Beneficial impacts of the traffic calming measures include reduced pedestrian/traffic conflicts and improved safety.

Table 4-1 identifies the traffic volume changes on the roadways within the park when compared to current volumes if the improvements in Alternative B are implemented by the Design Year 2030. The proposed transportation improvements identified in Alternative B would result in minimal changes to the regional AADT volumes, but would result in site-specific and local impacts in the park.

Alternative B also eliminates almost 500 parking spaces. Although the number of parking spaces eliminated is high, the actual usage of those spaces ranges from only 6% on weekdays to 13%± on weekends. Because parking would be expanded in two areas where it is needed, there would be a negligible net impact to site access.

Proposed improvements to the trail network would positively affect access to the park. The addition of limited trail sections to enable loops, as well as trailheads with restrooms and information, would increase access and the volume of use. Improved connections to regional trails would substantially improve accessibility to the park for bicyclists and pedestrians. Under all the action alternatives, a pedestrian bridge would be constructed over the Schuylkill River to substantially improve access between the north and south sides of the park. Another pedestrian crossing of US 422 to connect two parts of the park bisected by the highway also would substantially improve access, particularly for regional residents north of US 422. The precise type and location of this crossing are not known—detailed impact evaluations would be provided when the location, demand and design concepts for this trail improvement have been developed. These proposed actions and their impacts are the same under all the action alternatives.

Impacts Related to Park Operations Actions

The park operations actions specified in Alternative B would have negligible impacts on transportation and site access.

Cumulative Impact

Present and reasonably foreseeable future actions that would contribute to the cumulative impact are described under Alternative A. These projects, along with Alternative B, would result in a long-term, major, adverse cumulative impact to transportation and site access, with Alternative B contributing a noticeable increment.

Impacts of Alternative C: NPS Preferred

Implementation of the transportation elements and changes in the trail system would generate site-specific, local and regional changes to the flow of pedestrians, bicyclists and motor vehicles by increasing or decreasing visitor activity at certain locations within the park. Therefore, Alternative C would have major, beneficial impacts on the transportation and site access within the park. Outside the park Alternative C would have major, adverse impacts on the transportation facilities along Pawlings Road between PA Route 23 and US 422.

Impacts Related to Cultural Resource Management Actions

As with Alternatives A and B, cultural resource management policies and actions would have major, adverse, local and regional impacts on the traffic and transportation network. The mandate to preserve cultural resources, including archeological

resources, restricts the potential for undertaking capacity-adding projects to accommodate the increased AADT traffic volume as projected by DVRPC.

Impacts Related to Natural Resource Management Actions

The cultural resource management actions as specified in Alternative C would have minor, long-term beneficial and adverse impacts transportation and site access for the park. Development and implementation of a deer management plan would reduce the potential for conflicts with vehicular traffic in and around the park. The mission to preserve natural resources restricts the potential for completing capacity adding projects that improve traffic flow.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Alternative C would result in major, site specific, local and regional, beneficial and adverse impacts on transportation and site access.

The most significant change in vehicular travel patterns in and around the park is the proposed addition of a half diamond interchange between US 422 east and Pawlings Road. This interchange was originally proposed by the *Phoenixville Area Intermodal Transportation Study* (DVRPC 2003). The DVRPC network analysis of a connection between US 422 and Pawlings Road offers major relief to PA Route 23 through Valley Forge Village and the park. The traffic volume reductions on PA Route 23 would place additional traffic on Pawlings Road and PA Route 252, however. Upgrades to Pawlings Road would be required to adequately deal with the increased traffic volumes.

To improve safety, localized intersection improvements would be required to accommodate left turn lanes at key intersections, including that of Pawlings Road and Ferry Lane.

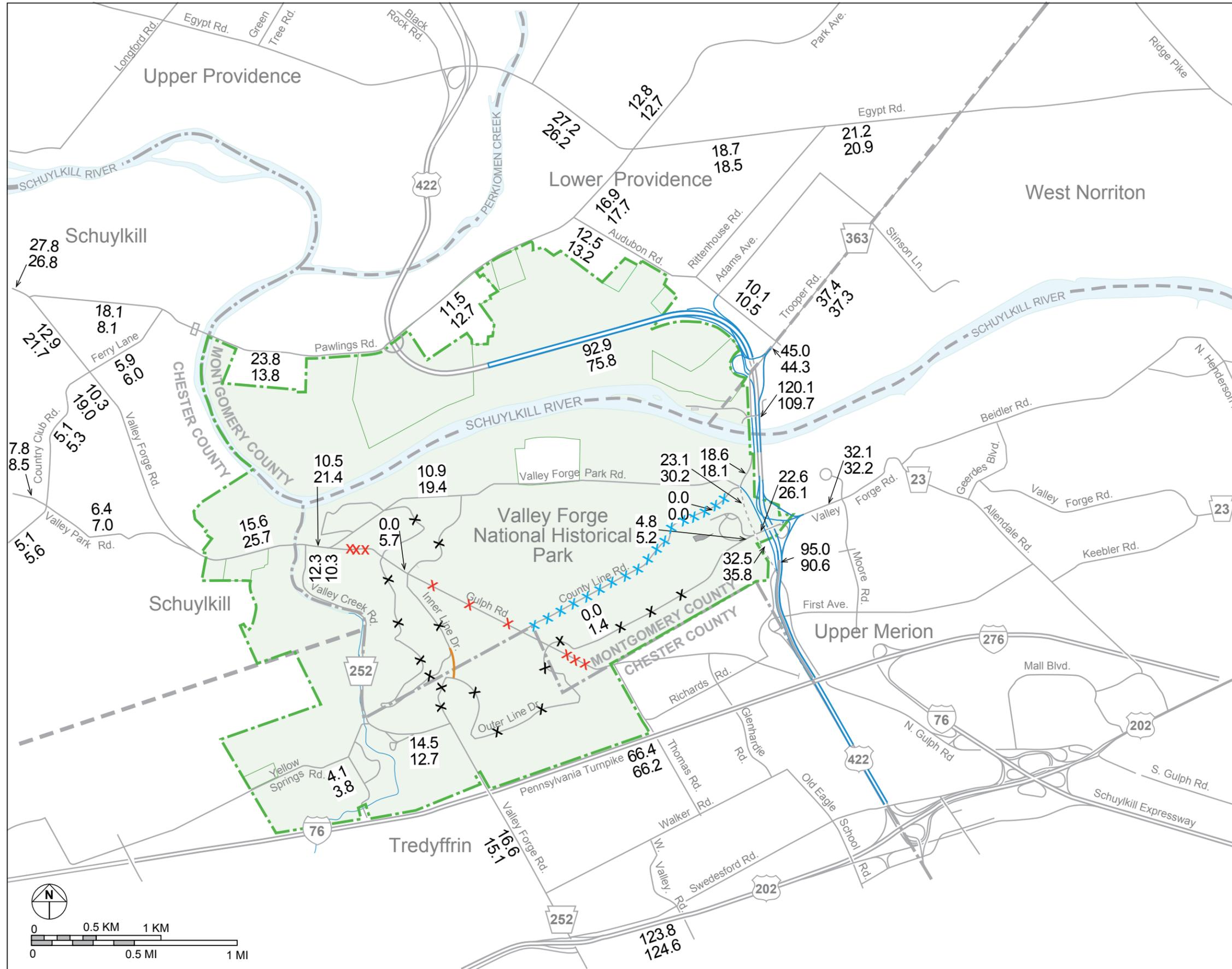
The traffic volume increases can still be accommodated with a two-lane facility. Detailed impact assessments associated with the Norfolk & Southern Railroad bridge replacement and the roadway improvements would be assessed when the project is added to the TIP.

As with Alternative B, Alternative C proposes Traffic Calming/Traffic Systems Management on PA Route 23 and PA Route 252 within the park. Gulph Road would be closed to all vehicular traffic between PA Route 23 and Thomas Road.

Figure 4-2 and Table 4-2 illustrates the projected changes in traffic volume in the key roadways in/around the park that would result from the proposed transportation elements in Alternative C.

As a result of the proposed Pawlings Road ramps and roadway improvements, traffic volumes on PA Route 23 *within the park* would range from 10,500 to 23,100 in the Design Year 2030. These volumes represent a reduction of 13% to 51% when compared to the No-Action volumes

Because daily commuters who previously used Gulph Road would divert their trips to PA Route 252 and PA Route 23, increases on PA Route 252 within the park would range from 10% to 19% over No-Action volumes (12,300 to 16,600 vehicles per day).



- Park Boundary
- Inholdings
- Independent Projects (in the River Crossing Complex)
- xxxxx County Line Road Closed to Public Use
- xxxxx Road Closed to Public Use
- xxxxx Seasonal Road Closures
- Proposed Shuttle Connector Road

30.2 Year 2030 Alternative C
 15.1 Year 2030 Alternative A
 Data Source: Delaware Valley Regional Planning Commission

- Principal Roadway Elements Included in Alternative C**
- Transportation conditions in Alternative A
 - Traffic calming and TSM measures for PA 23 and PA 252 in the park
 - Half-diamond interchange between Pawlings Road and US 422 east, with rebuilt RR overpass over Pawlings west of Schuylkill to allow travel to PA 23
 - Closure of Gulph Road and seasonal closure of Outer Line and Inner Line Drives to through-traffic and visitor autos
 - Reconfiguration of parking within park to accommodate new circulation patterns
 - Operation of a shuttle bus system to provide visitor circulation within park
 - New gateway entrance
 - Continuing advancement of transit access



Figure 4-2
 Future Traffic Volumes
 Average Annual Daily Traffic (AADT) (in thousands)
 Year 2030 Alternative A vs. Year 2030 Alternative C

Table 4-2
Design Year 2030 No-Action and Alternative C
Average Annual Daily Traffic Volumes

Road	From	To	2030 No-Action Traffic Volumes	Alternative C	Percent Change over No-Action Volumes
PA Route 23	Pawlings Rd	Ferry Lane	21,700	12,900	-41%
PA Route 23	Ferry Lane	Valley Park Rd	19,000	10,300	-46%
PA Route 23	Valley Park Rd	PA Route 252	25,700	15,600	-39%
PA Route 23	PA Route 252	Gulph Rd	21,400	10,500	-51%
PA Route 23	Gulph Rd	Old Betzwood Bridge	19,400	10,900	-44%
PA Route 23	Old Betzwood Bridge	Outer Line Dr	30,200	23,100	-24%
PA Route 23	N. Gulph Rd	West of US 422	26,100	22,600	-13%
PA Route 23	East of US 422	Moore Rd	32,200	32,100	0%
PA Route 252	PA Route 23	Yellow Springs Rd	10,300	12,300	19%
PA Route 252	Yellow Springs Rd	PA Turnpike (I-76)	12,700	14,500	14%
PA Route 252	PA Turnpike (I-76)	Walker Rd	15,100	16,600	10%
Pawlings Rd	PA Route 23	Ferry Lane	8,100	18,100	123%
Pawlings Rd	Ferry Lane	US 422	13,800	23,800	72%
Pawlings Rd	US 422	Audubon Rd	12,700	11,500	-9%
Pawlings Rd	Audubon Rd	Egypt Rd	17,700	16,900	-5%
Gulph Rd	PA Route 23	County Line Rd	5,700	0	Closed
Outer Line Dr	Visitor's Center	Gulph Rd	1,400	0	Closed
Outer Line Dr	Visitor's Center	PA Route 23	5,200	0	Closed

Source: DVRPC, 2004

The transportation facilities around the park would experience traffic volume increases over the No-Action conditions in 2030. Traffic volumes on Pawlings Road between PA Route 23 and Egypt Road would range from 11,500 to 23,800 in Alternative C. Increases on Pawlings Road west of US 422 would range between 72% and 123%; decreases east of US 422 on Pawlings Road range from -5% to -9%. These changes would be directly related to the proposed eastbound on-ramp and westbound off-ramp at Pawlings Road and US 422.

As with Alternative B, Alternative C proposes Traffic Calming/Traffic Systems Management on PA Route 23 and PA Route 252 within the park. Gulph Road would be closed to all vehicular traffic between PA Route 23 and Thomas Road. These closures remove the commuter and visitor vehicles through the center of the park, eliminate the awkward Y intersection with PA Route 23, eliminate the pedestrian conflict at the Memorial Arch and enhance the quality of park visitor experience and pedestrian/bike safety.

Gulph Road currently carries 2,900 vehicles per day and is projected to grow to 5,700 vehicles per day in No-Action. The majority of current traffic on Gulph Road through the park is morning peak period commuters destined for the office centers along the US 202 corridor in Tredyffrin Township, and their afternoon return.

The traffic forecast indicates that half of this traffic would be diverted to PA Route 252 proceeding south 2.2 miles to the US 202 corridor. A quarter of the diverted traffic would continue east on PA Route 23 then south on North Gulph Road or US 422. The remainder would utilize the US 422 corridor or other roadways on the north side of the river.

The impact of closing Outer Line Drive in Alternative C would be minimal to commuter traffic since most of that traffic is currently park visitors. Closing Inner Line Drive would have no impact to commuter traffic. Closure of these park tour roads to personal vehicles would result in less convenience to park visitors. Shuttle service would be provided to maintain access to areas within the park to which vehicular access is eliminated, however. The removal of eight existing parking lots on the closed tour roads would have no additional impact to visitor access.

Changes to the trail system, and projected impacts from the changes, are the same under all the action alternatives.

Impacts Related to Park Operations Actions

Site-specific and local impacts would be associated with the relocation of the maintenance facility, including vehicle service areas. The level of impact would be determined by the location that is selected for the facility, although impacts over the No-Action alternative could be expected to be negligible

Cumulative Impact

Present and reasonably foreseeable future actions that would contribute to the cumulative impact are described under Alternative A. These projects, along with Alternative C, would result in a long-term, major, beneficial cumulative impact, as well as a long-term, moderate, adverse cumulative impact to transportation and site access. Alternative C would contribute an appreciable increment.

Conclusion

The overall impact to transportation and site access under Alternative A would be major, and it would contribute appreciable increments to a major cumulative impact.

The overall impact to transportation and site access under Alternative B would be minor, and it would contribute noticeable increments to a major cumulative impact.

The overall impact to transportation and site access under Alternative C would be major, and both alternatives would contribute appreciable, beneficial increments to a major cumulative impact.

4.8 Impacts to Park Operations and Facilities

Methodology

Park operations and facilities, for the purpose of this analysis, refers to the quality and effectiveness of the infrastructure, and the ability to maintain the infrastructure used in the operation of the park. The analysis also includes comparisons of staffing for each alternative. See Appendix H for comparisons of staffing under each alternative.

Impact analysis is based on the current description of park operations presented in Section 3.8: Park Operation and Facilities of this document. The following level of intensity definitions are applied to each alternative.

- Negligible:*** Park operations and facilities would not be affected, or the impacts would be at low levels of detection and would not have an appreciable effect on park operations.
- Minor:*** The effect would be detectable and likely short-term, but would be of a magnitude that would not have an appreciable effect on park operations and facilities.
- Moderate:*** The impacts would be readily apparent, likely long-term, and would result in a substantial change in park operations and facilities in a manner noticeable to staff and to public.
- Major:*** The impacts would be readily apparent, long-term, would result in a substantial change in park operation and facilities in a manner noticeable to staff and the public and be markedly different from existing operations.

Impacts of Alternative A: No-Action

Impacts Related to Cultural Resource Management Actions

Under Alternative A, no cultural resources initiatives would be taken, so there would be no impact to park operations.

Impacts Related to Natural Resource Management Actions

No natural resources initiatives would be taken, so there would be no impact to park operations.

Impacts Related to Public Use, Enjoyment, and Experience Actions

Under Alternative A, no visitor use and experience initiatives would be taken. So there would be no impact to park operations.

Impacts Related to Park Operations Actions

Park staffing would continue to decline as employment costs rise, while the park budget stays flat or declines. It could be increasingly difficult to meet the park mission. There would be no new source of revenue such as leasing, visitor fees, or additional retail revenue. Overall, there could be a moderate, long-term, adverse impact to park operations and facilities. On-site visitor spending is expected to remain constant at the current level of \$800,000.

This activity is confined to the retail operations housed in the Welcome Center and vending machines in the park. In 2005, the park began to charge year-round fees to visitors at Washington's Headquarters, which totaled \$94,477. See Appendix J for more detailed spending information.

Existing staff would perform collateral duties and continue to manage partnerships and volunteers and to seek grants at existing levels.

No park quarters would be eliminated under Alternative A, requiring continuing investments of funds and maintenance staff time, posing a moderate, long-term, adverse impact. No unused park buildings would be leased, requiring continuing

investments of funds and maintenance staff time, posing a moderate, long-term, adverse impact.

The ranger station and the maintenance complex would both remain in their current locations, so inefficiencies in operations would continue. Costs to keep the buildings in adequate repair and updated for security needs would remain high, posing moderate, long-term, adverse impacts to park operations and budget.

Cumulative Impact

Present and reasonably foreseeable future actions that would contribute to cumulative impacts on park operations and facilities include the RCC projects, the widening of the PA Turnpike, the SVM, and the asbestos remediation.

During the construction of the replacement Betzwood Bridge and other RCC traffic and transportation projects, and the widening of the PA Turnpike, there would be additional demands placed on park law enforcement, maintenance, and natural resources staff to manage the impacts of the construction process on park resources and visitor use, posing a minor, short-term, adverse impact. Implementation of a possible station in the park for the SVM would place additional demand on park managers during the planning process and on resource staff during rehabilitation of the station, posing a negligible, short-term, adverse impact. Implementation of the ARS would place considerable demands on park management and resource staff, posing a moderate, short-term, adverse impact. Overall, there would be no long-term impacts due to these projects.

These projects, along with the impacts of Alternative A, would result in both short-term and long-term, moderate, adverse cumulative impacts to park operations and facilities. Alternative A would contribute appreciably to this cumulative impact.

Impacts of Alternative B

Impacts Related to Cultural Resource Management Actions

Active preservation of earthworks and archeological sites would require more labor than Alternative A. Most labor could be undertaken by volunteers and through contracts, although supervision by NPS archeological and maintenance staff would be necessary. Additional NPS project management staff also would be necessary to manage contracts for rehabilitation of historic structures. Reorganization and retraining of maintenance staff is proposed, in order to keep the structures in good condition through regular maintenance, posing a major, long-term beneficial impact to park operations.

Impacts Related to Natural Resource Management Actions

Active management of natural resources as well as more time and attention toward more effective external relations to influence actions beyond the park boundary would require more strategic use of such resources as partner organizations, grants, universities, scholars, university and Student Conservation Association interns, seasonal park staff, and volunteers. Existing park natural resource staff would reorganize their work to better manage such opportunities in order to meet the mission and goals for natural resources. There would be a major, long-term, beneficial impact to park operations.

Impacts Related to Public Use, Enjoyment, and Experience Actions

The opening of the Valley Forge Train Station and the Maurice Stephens house as staffed interpretive sites would require additional interpretive staff, as well as greater use of volunteers. This would pose a minor, long-term, adverse impact to the park budget. The reliance on interpretive media and technology at other park interpretive sites would require a full-time exhibit specialist with technical expertise. A full-time education specialist would be required. Existing staff would be reorganized and retrained to provide these services. Existing interpretive staff would reorganize their work to better manage such resources as Student Conservation Association interns, seasonal park staff, and volunteers, posing a major, long-term beneficial impact to park operations.

Additional project management staff would be necessary to manage contracts and volunteers to complete remaining trail sections and maintain all park trails at an acceptable level. Reorganization and retraining of existing park staff would provide this service.

Impacts Related to Park Operations Actions

In order to generate new sources of revenue, including fees, partnerships, donations, and grants, and to take advantage of opportunities such as leasing, a new position to develop and manage alternative funding sources would be established. A volunteer recruiter/coordinator position also would be established both to recruit and place volunteers and also to increase the park's capacity to use volunteers most effectively. These services would be combined in one new position, which would result in a minor, short-term adverse impact to the park's budget, but a minor-to-moderate, long-term impact to the park's budget and to park operations as the level of alternative support increased.

Reduction of the number of buildings available for park quarters would mean that some staff would move their residences out of the park. Because former quarters buildings would be leased, or in a few cases, demolished, reduction also would result in less need for park maintenance staff to maintain those buildings, freeing them to keep historic structures that are used for park needs rehabilitated and in good condition. These actions would pose a major, long-term, beneficial impact to operations and the park budget.

Utilization of the new authority to lease dis-used park buildings would mean that, once rehabilitated, no park funds would be required for maintenance. Depending on the terms of such leases and on the physical conditions of buildings when first leased, leasing could provide a revenue stream for the park. Leasing also would result in less need for park maintenance staff to maintain those buildings, freeing them to keep historic structures used for park needs rehabilitated and in good condition. Leasing would pose a major, long-term, beneficial impact to park operations. The amount of net revenue cannot be predicted at this time. Depending on the amount, there could be a long-term, beneficial impact to the park budget that could range from negligible to major.

Visitor Spending under Alternative B is expected to increase in proportion to the increase in history visitors. Thus, the \$800,000 in sales recorded at the Welcome Center gift shop should increase by 10% to a total sales level of \$880,000 (see Appendix J). The collection of park-wide visitor fees would also provide a revenue stream for the park. The amount of net revenue cannot be predicted at this time.

Depending on the amount, there could be a long-term, beneficial impact to the park budget that could range from negligible to major.

Relocation of the ranger station would provide better access to the park and adequate and secure space for operations, posing a moderate, long-term, beneficial impact to operations.

Because the maintenance complex would remain in its current location, there would continue to be inefficiencies in operation. Also, costs to keep the buildings sound would remain high, posing moderate, long-term, adverse impacts to park operations and budget.

Cumulative Impact

Present and reasonably foreseeable future actions that would contribute to cumulative impacts on park operations and facilities would be the same as those described under Alternative A. These projects, along with Alternative B, would have moderate, short-term, adverse and major, long-term, beneficial cumulative impacts on park operations and facilities. Alternative B would contribute appreciably to this cumulative impact.

Impacts of Alternative C: NPS Preferred

Impacts Related to Cultural Resource Management Actions

Impacts would be the same as those predicted for Alternative B.

Impacts Related to Natural Resource Management Actions

Impacts would be the same as those predicted for Alternative B.

Impacts Related to Public Use, Enjoyment, and Experience Actions

The opening of the Valley Forge Train Station and the Maurice Stephens house as staffed interpretive sites would reorganization of existing interpretive staff, as well as greater use of volunteers. The reliance on interpretive media and technology at other park interpretive sites would require a full-time exhibit specialist with technical expertise. A full-time education specialist would be required. Existing staff would be reorganized and retrained to provide these services. Existing interpretive staff would reorganize their work to better manage such resources as university and Student Conservation Association interns, seasonal park staff, and volunteers, posing a major, long-term beneficial impact to park operations.

Additional project management staff would be necessary to manage contracts and volunteers to complete remaining trail sections and maintain all park trails at an acceptable level. Reorganization and retraining of existing park staff would provide this service.

Impacts Related to Park Operations Actions

In order to generate new sources of revenue, including fees, partnerships, donations, and grants, and to take advantage of opportunities such as leasing, a new position to develop and manage alternative funding sources would be established. A volunteer recruiter/coordinator position also would be established both to recruit and place volunteers and also to increase the park's capacity to use volunteers most effectively. These services would be combined in one new position, which would result in a minor, short-term adverse impact to the park's budget, but a minor-to-

moderate, long-term impact to the park's budget and to park operations as the level of alternative support increased.

Reduction of the number of buildings available for park quarters would mean that some staff would move their residences out of the park. Because former quarters buildings would be leased, or in a few cases, demolished, reduction also would result in less need for park maintenance staff to maintain those buildings, freeing them to keep historic structures that are used for park needs rehabilitated and in good condition. These actions would pose a major, long-term, beneficial impact to operations and the park budget.

Utilization of the new authority to lease dis-used park buildings would mean that, once rehabilitated, no park funds would be required for maintenance. Depending on the terms of such leases and on the physical conditions of buildings when first leased, leasing could provide a revenue stream for the park. Leasing also would result in less need for park maintenance staff to maintain those buildings, freeing them to keep historic structures used for park needs rehabilitated and in good condition. Leasing would pose a major, long-term, beneficial impact to park operations. The amount of net revenue cannot be predicted at this time. Depending on the amount, there could be a long-term, beneficial impact to the park budget that could range from negligible to major.

Visitor spending under Alternative C is expected to increase in proportion to the increase in history visitors. Thus, the \$800,000 in sales recorded at the Welcome Center gift shop should increase by 10% to a total sales level of \$880,000 (see Appendix J). The collection of park-wide visitor fees would also provide a revenue stream for the park. The amount of net revenue cannot be predicted at this time. Depending on the amount, there could be a long-term, beneficial impact to the park budget that could range from negligible to major.

Relocation of the ranger station would provide better access to the park and adequate and secure space for operations, posing a moderate, long-term, beneficial impact to operations. Relocation of the maintenance complex would provide safe, efficient, and adequate work space for operations, posing a moderate, long-term, beneficial impact to operations.

Cumulative Impact

Present and reasonably foreseeable future actions that would contribute to cumulative impacts on park operations and facilities would be the same as those described under Alternative A. These projects, along with Alternative C, would have a moderate, short-term, adverse and major, long-term beneficial cumulative impact on park operations and facilities. Alternative C would contribute appreciably to this cumulative impact.

Conclusion

The overall impact to park operations and facilities under Alternative A would be moderate, long-term, and adverse, and it would contribute appreciably to the short-term, moderate, and long-term, adverse cumulative impact.

The overall impact to park operations and facilities under Alternatives B and C would short-term, moderate, and adverse, as well as long-term, major, and beneficial. Each alternative would also contribute appreciably to the short-term, moderate, adverse, and long-term, major, beneficial cumulative impact.

4.9 Summary and Conclusion

4.9.1 Alternative A: No-Action Alternative

Because Alternative A would continue the present management objectives for cultural and natural resources, historic structures, cultural landscape patterns, surface waters, floodplains, vegetation and wildlife, and lightscapes would continue to be adversely impacted. Damage and/or loss of these resources would be imminent.

The lack of interpretation and a defined visitor experience would continue to adversely affect visitor experience, understanding, and use of the site.

Because no new traffic congestion management initiatives would be implemented, heavy through-traffic within the park would continue to interfere with visitor use and experience and adversely affect cultural and natural resources.

Impacts to park operations and facilities would be moderate and adverse, as no new partnership initiatives would be undertaken. Park facilities would continue to deteriorate through deferred maintenance. Preservation and interpretive initiatives would also be hindered, as additional staffing (from partners and volunteers) and funding diminished as well.

4.9.2 Alternative B

Alternative B would enhance the park's ability to manage cultural resources by stabilizing, preserving, and rehabilitating historic structures, as well as preserving the small-scale and major features within the cultural landscape: an overall long-term, beneficial impact to these resources.

For natural resources, the health of the forests and meadows, as well as the wildlife that inhabit these areas, would be enhanced through active management and environmental restoration. Over the long-term, biodiversity would improve, resulting in a major beneficial to vegetation and wildlife. Geologic resources, water resources, floodplains, air quality, soundscapes, and lightscapes would all be impacted beneficially through improved resource management and cooperation with partners to minimize outside, adverse impacts on these resources.

The visitor experience would be beneficially impacted due to new interpretive options, improved orientation, and the use of technology. The calming of through-traffic on public roads within the park would beneficially impact visitor safety and lead to a better visitor experience.

Impacts to park operations and facilities would be adverse in the short-term; however, as partnerships and volunteer opportunities were actively pursued, the overall impact would be major and beneficial. Volunteers and partners would further preservation and interpretive initiatives, and park staff and funding could be focused where it is needed.

4.9.3 Alternative C: NPS Preferred

Alternative C would include similar beneficial impacts as described for Alternative B. However, Alternative C would also include additional beneficial impacts to cultural landscapes, topography, visitor use and experience, and transportation and site access.

In Alternative C, the cultural landscape of two interpretive focus areas (Grand Parade and Muhlenberg's Brigade) would be rehabilitated to 18th century conditions, and the quarries within the Grand Parade (except Cave Quarry) would be filled to their elevations. This would benefit not only the cultural landscape but also visitor understanding and experience of this resource.

Visitor experience would further be enhanced under Alternative C through the rehabilitation of historic views between Redoubts 1, 2, 3, and 4 and Stony Battery to Star Fort. Visitors would also have more options for exploration of the site, with the combination of self-discovery/use of technology at some interpretive areas, as well as the immersive experiences offered at the Grand Parade, Muhlenberg's Brigade, and Washington's Headquarters (to some extent). The closure of some public roads to visitor and through-traffic would beneficially impact resources as well as the visitor experience, and visitor access to sites would also be enhanced through the use of a shuttle.

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