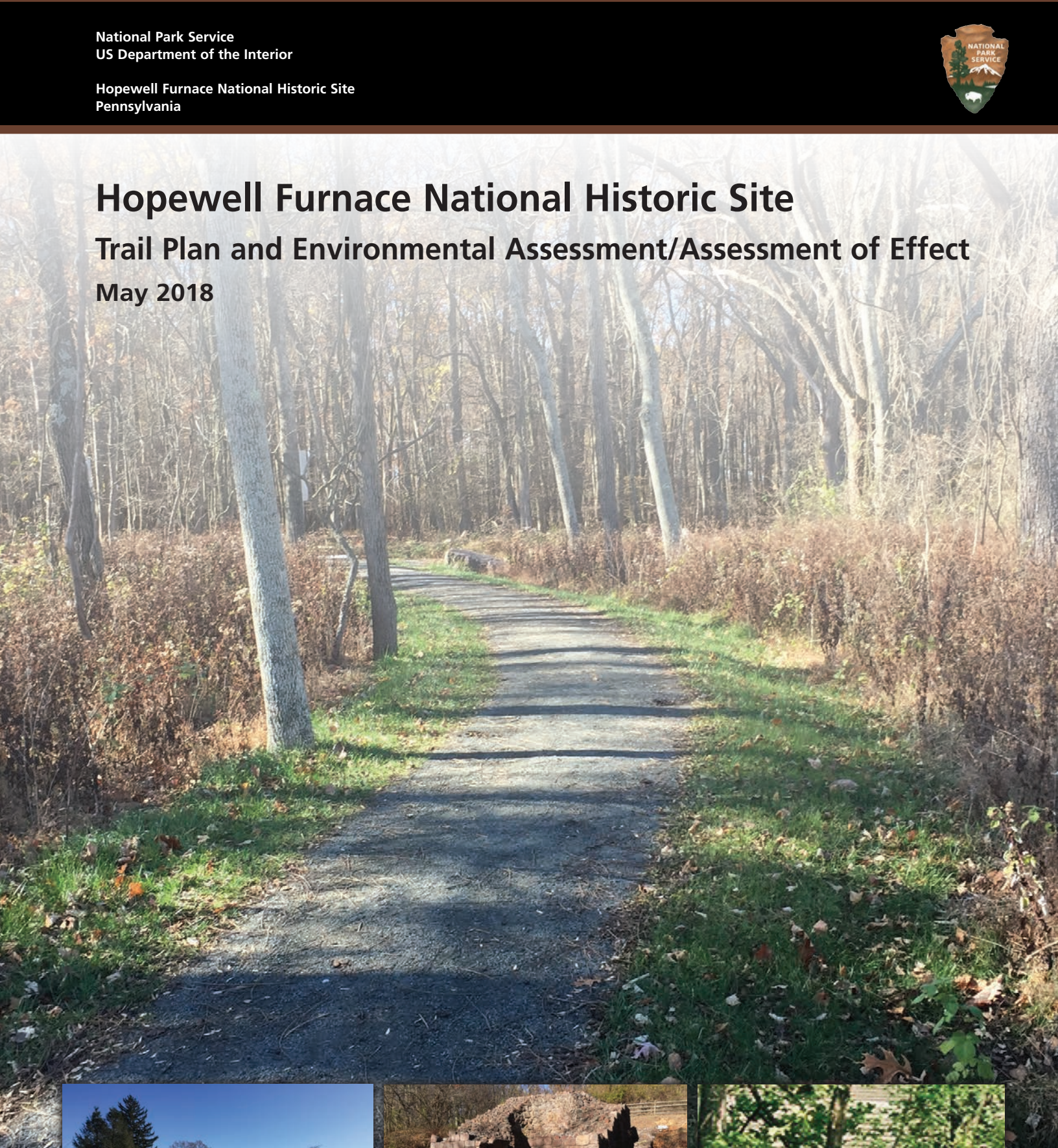




# Hopewell Furnace National Historic Site

## Trail Plan and Environmental Assessment/Assessment of Effect

May 2018



Cover Photos by: VHB

**United States Department of the Interior  
National Park Service  
Hopewell Furnace National Historic Site**

**Trail Plan  
Environmental Assessment/Assessment of Effect**

**May 2018**

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Through this trail plan, the National Park Service (NPS) is exploring options to improve wayfinding, trail use information, and trail connections for Hopewell Furnace National Historic Site (the park), including the existing approximately 12-mile network of pedestrian and equestrian trails. Some park trails are connected to trails within the surrounding French Creek State Park and Natural Lands' Crow's Nest Preserve. There also has been a recent growth of regional trail networks in the Schuylkill River area. This trail plan is needed because the park does not have a full understanding of the existing trail network, including conditions of trail surfaces and signage, maintenance needs, clarity of existing connections to surrounding public lands, and opportunities for connections that expand the visitor experience while protecting park cultural and natural resources.

This document was prepared to satisfy the requirements of the National Environmental Policy Act (NEPA) and Section 106 of the National Historic Preservation Act (NHPA). This environmental assessment/assessment of effect evaluates the impacts of a no-action alternative and two action alternatives. The no-action alternative would include the continuation of current trail management. The action alternatives would include different options for improved wayfinding, connectivity, and bicycle use in the park. The alternatives would result in both beneficial and adverse impacts on visitor use and experience, cultural landscape and historic structures, and archeological resources. These impacts would be associated with changes in trail use, new trails, changes in historic appearance, ground-disturbing activities, and construction activities.

**Note to Reviewers and Respondents:**

If you wish to comment on this environmental assessment/assessment of effect, you may mail comments within 30 days of release of this document to the name and address below or you may post them electronically at <http://parkplanning.nps.gov/HOFU>. Before including your address, phone number, email address, or other personal identifying information in your comment, you should be aware that your entire comment, including your personal identifying information, may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we would be able to do so.

Superintendent  
Hopewell Furnace National Historic Site  
2 Mark Bird Lane  
Elverson, PA 19520

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# CHAPTER 1

## PURPOSE AND NEED

### INTRODUCTION

Located within the Schuylkill River valley in Berks and Chester Counties, Pennsylvania, Hopewell Furnace National Historic Site (the park) preserves and interprets one of the finest examples of an early American iron-making village, which operated from 1771–1883. The park’s purpose is to preserve the late-18th and 19th century setting of the iron-making village, including the charcoal-fueled furnace, and its natural and cultural resources. This village illustrates the essential role of industrialization in the growth of the early United States.

Through this trail plan, the National Park Service (NPS) is exploring options to improve wayfinding, trail use information, and trail connections throughout the park, which includes approximately 12-miles of pedestrian and equestrian trails. Some trails in the park network are also connected to trails within the surrounding French Creek State Park (the state park) and Natural Lands’ Crow’s Nest Preserve (the preserve). In addition, there has been a recent growth of regional trail networks in the Schuylkill River area. This trail plan considers options for pedestrian, equestrian, and potential bicycle use on all or portions of the park trail network in a manner that maintains the historic character of the park, protects its natural and cultural resources, and facilitates connectivity with surrounding regional trail networks. With this project, the NPS is reviewing the park-wide trail network to assist with a holistic approach to trail management, including use, maintenance, and sustainability.

This environmental assessment/assessment of effect (EA/AoE) describes the no-action alternative and two action alternatives, including the proposed action, and analyzes the potential impacts these alternatives would have on the natural, cultural, and human environment. This document has been prepared in accordance with the National Environmental Policy Act of 1969 (NEPA); regulations of the Council on Environmental Quality (CEQ) (40 CFR 1500-1508); and NPS Director’s Order #12: *Conservation Planning, Environmental Impact Analysis, and Decision-Making* (NPS 2011) and accompanying NPS NEPA Handbook (NPS 2015). In addition, the NPS is integrating the NEPA compliance process with that for Section 106 of the National Historic Preservation Act of 1966 (NHPA), and using the NEPA documentation and coordination processes for Section 106 compliance pursuant to 36 CFR 800.8(c); therefore, this environmental assessment also serves as an assessment of effect to historic properties under Section 106.

### PURPOSE OF AND NEED FOR ACTION

The purpose of this trail plan is to preserve the natural and cultural resources of the park and improve connections with the surrounding public lands and regional trail networks.

The NPS needs to determine the types of uses to be permitted on trails, how and where the trails connect to other surrounding trail networks, and the types of experiences to offer trail users. Additionally, wayfinding and visitor information is limited throughout the trail network. Improved information related to park boundaries, trail ownership, trail use, and connections to other trails and

public lands is needed. Connections between the park and surrounding public lands are often poorly marked; visitors on a given trail may not know, for example, that they are transitioning from a state park to a national park, where permitted uses may be different. Some state park mountain biking trails connect to park trails where biking is not permitted. There is a need to improve the clarity of permitted uses at these connection points. Sustainability of trails also needs to be addressed, including surface treatment, materials, maintenance needs, and cost. Additionally, some trails are located within or near sensitive natural and cultural park resources, and the protection of these resources needs to be addressed.

Objectives for the trail plan include the following:

- § Improve wayfinding and signage throughout the trail network including connections, approved use, interpretive opportunities, and park boundaries
- § Determine appropriate trail uses, locations, destinations, and desired connections for the in-park trail network
- § Promote safety of all trail users
- § Foster sustainability of trails as related to surface treatment, types of uses, maintenance needs, and cost
- § Protect the natural and cultural resources within the park

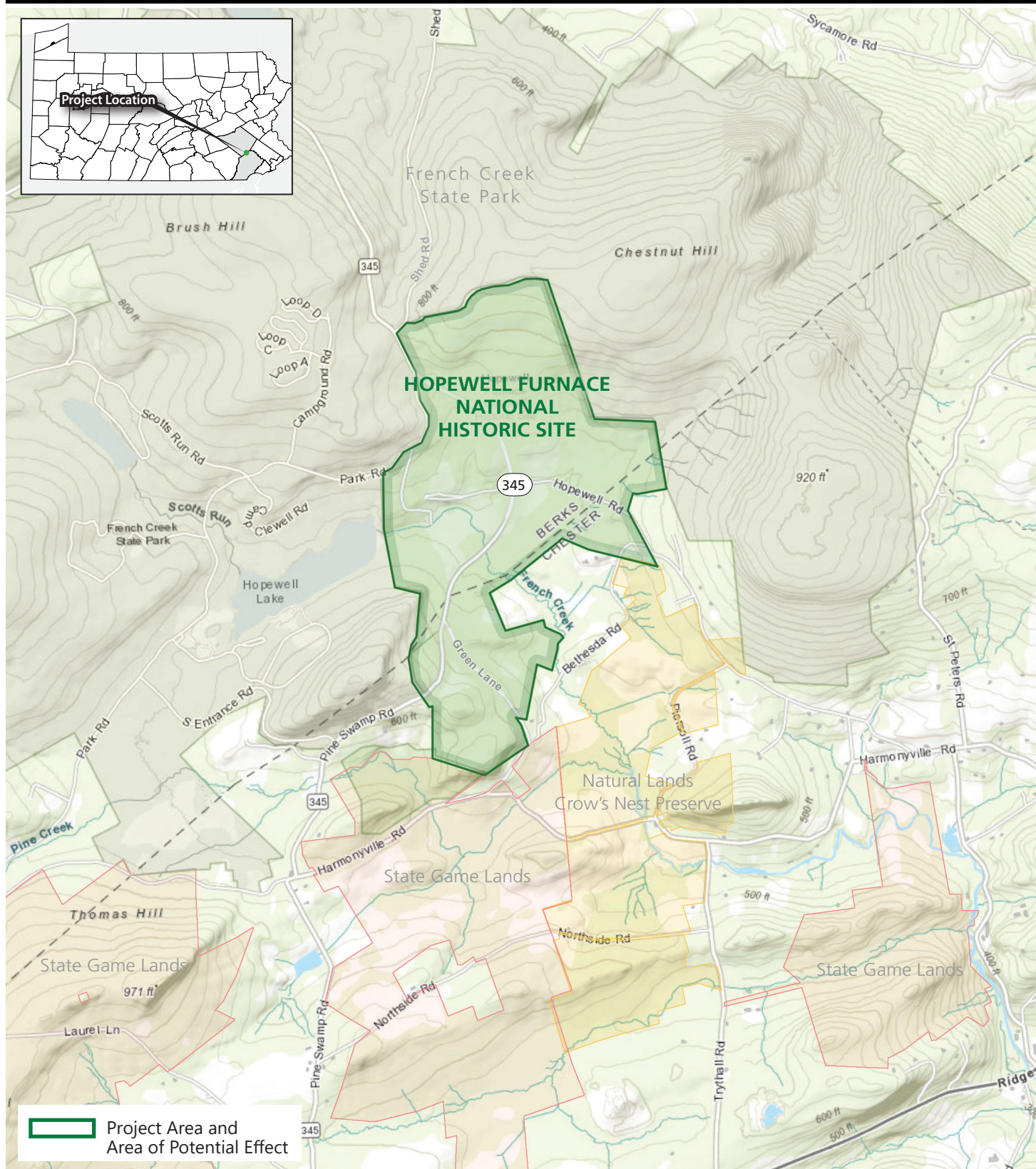
## **PROJECT AREA AND AREA OF POTENTIAL EFFECT**

The park is located approximately five miles south of Birdsboro in Berks County and Chester County, Pennsylvania. It is located within the largest contiguous forest in southeastern Pennsylvania and includes uplands, woodlands, farmland, meadows, and pastures, and is surrounded on the north, east, and west by French Creek State Park and on the south by Pennsylvania State Game Lands and the Crow's Next Preserve (see figure 1). The project area encompasses the entirety of the park's 848 acres, as shown on figure 2.

In compliance with NHPA Section 106 regulations (36 CFR 800), an area of potential effect is also defined for this project area. The area of potential effect is defined as the geographic area in which an undertaking may directly or indirectly cause alterations in the character or use of historic properties if such properties exist. The area of potential effect for this project includes the entirety of the park's 848 acres, as shown on figure 2.

## **RELATIONSHIP TO 36 CFR 4.30, NPS FINAL BICYCLE RULE**

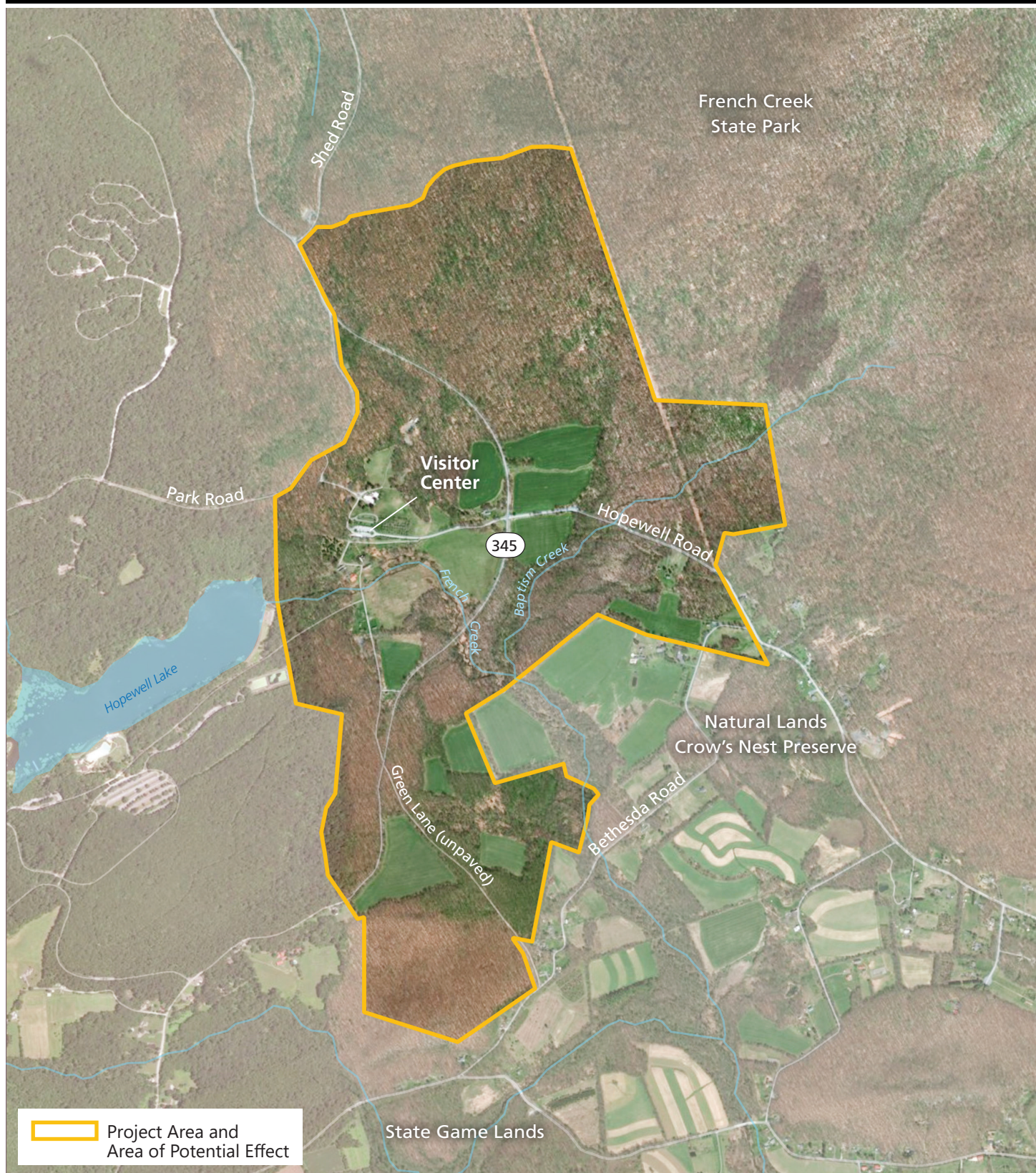
According to 36 CFR 4.30, bicycle use within national parks is limited to park roads unless otherwise specified. Designating new trails for bicycle use outside of specifically designated developed areas requires that the park carefully consider the impacts of adding bicycle use to the trail, obtain the approval of the Regional Director, and promulgate a special regulation authorizing bicycle use. The proposed alternatives in this trail plan include bicycle use on existing and/or new trails in the park. Although these trails would travel through relatively developed areas of the park, none of the park's planning documents designate these areas for development; therefore, 36 CFR section 4.30(e)(2) applies, as described above. In accordance with this rule, this EA considers and evaluates suitability of the trail surface and soil conditions for accommodating bicycle use, life



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FIGURE 1  
Project Vicinity Map



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FIGURE 2  
Project Area and Area of Potential Effect

cycle maintenance costs, safety considerations, strategies to prevent or minimize user conflicts, and methods of protecting natural and cultural resources.

## ISSUES AND IMPACT TOPICS RETAINED FOR DETAILED ANALYSIS

During the scoping process, specific considerations and concerns were identified as critical to this project. Along with the purpose and need for the proposed action, these issues guided the development of alternatives and contributed to the selection of impact topics, as described below.

**There is a lack of wayfinding information throughout the park.** Wayfinding throughout the park is limited, inconsistent, and in some cases unclear. Signage and trail maps lack clear information about allowed uses, trail connections to other areas of the park, and trail connections to surrounding public lands. Park boundaries also are unclear in some places and users may not know when they cross the boundary between the park and other public lands. The alternatives have the potential to improve wayfinding and information about the trail network including trail locations, allowed uses, existing connections throughout the park and to adjacent public lands, and location of land ownership boundaries. However, additional signage would potentially detract from the cultural landscape of the park and/or disturb intact archeological resources that may exist if digging is required for installation. Potential impacts of the alternatives will be analyzed in detail under the impact topics of “Visitor Use and Experience,” “Cultural Landscape and Historic Structures,” and “Archeological Resources.”

**The park is known to be archeologically sensitive.** Archeological surveys conducted within the park over the past 70 years have documented a range of archeological resources spanning the precontact period through the 20th century (PAL 2011). In addition to the known resources, the park also has the potential to contain undiscovered archeological resources of the same time range. Much of the park has been identified as having either moderate or high sensitivity for precontact or postcontact resources (PAL 2011). Increased use of trails or use of new trails throughout the park have the potential to disturb any intact archeological resources that may exist, due to compaction. Compaction may result in disturbance of or damage to the resource if the layers of soil in which it sits are compressed or disturbed. Construction activities related to proposed improvements also have the potential to disturb intact archeological resources due to ground disturbance that may be required. Digging or other ground disturbance has the potential to remove resources from their intact context within the soil. Potential impacts of the alternatives will be analyzed in detail under the impact topic of “Archeological Resources.”

**The park is a documented cultural landscape with historic structures in the vicinity of trails.** The park is listed in the National Register of Historic Places (National Register) and holds significance and integrity from the entire history of the site. Contributing resources of the cultural landscape encompass both cultural and natural features, including vegetation, buildings and structures (including ruins), circulation, views, and small-scale features (KFS 1997). Additionally, historic structures are present related to the furnace operation in the 18th and 19th centuries and later NPS operation of the park in the 20th century. Many of these historic structures are situated near or adjacent to existing trails. The alternatives include elements that would introduce modern materials into the cultural landscape and historic setting for new signage, trails, and uses. These new elements have the potential to detract from the overall appearance of the cultural landscape and setting of the historic structures. Potential impacts of the alternatives will be analyzed in detail under the impact topic of “Cultural Landscape and Historic Structures.”

## ISSUES AND IMPACT TOPICS DISMISSED FROM FURTHER ANALYSIS

### WETLANDS AND OTHER WATERS OF THE US

Approximately 78 acres of palustrine wetlands exist within the park boundaries (NPS 2017). French Creek, which is a tributary of the Schuylkill River, is designated by the State of Pennsylvania as a State Scenic River for its outstanding natural and scenic values (James 2016). French Creek is also designated by the state as an Exceptional Value stream and a cold water fishery. Some existing trails and proposed trails cross or are adjacent to these wetlands and other waters of the US. However, mitigation measures would be in place to avoid impacts on those resources.

Erosion caused by construction of new trails, widening and resurfacing of some existing trails, and/or replacement and construction of new bridges could result in changes to water quality and biological conditions of these water resources if eroded materials were deposited into the wetland downhill from the trail. However, measures would be in place to limit stormwater runoff as described in the “Mitigation Measures” section in chapter 2. Assuming proper installation and maintenance of these erosion and sediment control methods in sensitive areas, these potential adverse impacts would only last the duration of construction and would be relatively unnoticeable in the larger context of the wetland and stream system throughout the park. Further, conditions would likely return to normal shortly after construction is completed. Erosion and sedimentation post-construction would be mitigated and controlled through design of the trail. Specific control measures would be determined during a future design phase but could include grade reversals, geotextiles, insloped/outsloped treads, and drainage features. Disturbed areas not finished with trail surface would be revegetated to control erosion. With these measures in place, ongoing impacts to wetlands and other waters of the US are not anticipated after construction is completed. Any construction impacts related to erosion are expected to be relatively small when compared to the overall water quality, functions, and values of the wetlands and other waters of the US system throughout the park. The proposed bridges over stream crossings would be considered an excepted action under Director’s Order #77-1: *Wetland Protection* and would not require a Wetlands Statement of Findings. Additionally, because the stream crossings are located in a wooded area that is already shaded, impacts due to shading from the larger/new bridges are not expected. Therefore, the impact topic of wetlands and other waters of the US was dismissed from further analysis.

### SPECIAL STATUS SPECIES

The project area is within the range of four federally listed rare, threatened, or endangered species including the red knot (*Calidris canutus rufa*), the Indiana bat (*Myotis sodalis*), the northern long-eared bat (*Myotis septentrionalis*), and the bog turtle (*Glyptemys muhlenbergii*). Adverse impacts to these species would be avoided for all actions proposed in this environmental assessment/assessment of effect. Impacts to the habitat of the bog turtle would be avoided by limiting the use of heavy equipment and excavation work within 300 feet of known habitat to November through March. If work is required outside of that time frame, exclusion fencing around known habitat in the vicinity would be installed to avoid disturbance. Tree clearing, if required, and the use of heavy machinery would be avoided between April 1 and September 30, which encompasses the sensitive roosting and pupping seasons of the Indiana bat and the northern long-eared bat. No critical habitats are located within the project area. Therefore, the impact topic of special status species was dismissed from

further analysis. The NPS would initiate consultation with the US Fish and Wildlife Service in the event that any federally-listed threatened or endangered species are encountered during construction.

In addition to federally listed species, several state-listed rare, threatened, or endangered species are known to occur within the park. These include species such as the long-eared owl (*Asio otus*), the blackpoll warbler (*Setophaga striata*), and the Eastern spadefoot toad (*Scaphiopus holbrookii*) (James 2016). As with the federally listed species, all adverse impacts on these state-listed species would be avoided for all actions proposed in this environmental assessment/assessment of effect. The NPS consulted with the Pennsylvania Game Commission during the initial scoping period and no issues related to these state-listed species were identified.

## ENVIRONMENTAL JUSTICE

The Department of the Interior requires its bureaus to specifically discuss and evaluate the impacts of their actions on minority and low-income populations and communities, as well as the equity of the distribution of the benefits and risk of the decision (NPS 2015). Environmental justice was considered but dismissed from further analysis for the following reasons:

- § The park staff and planning team solicited public participation as part of the planning process and gave equal consideration to all input from persons regardless of age, race, income status, or other socioeconomic or demographic factors.
- § Implementation of the proposed action would not result in any identifiable adverse human health effects. Therefore, there would be no direct or indirect adverse impacts on any minority or low-income population.
- § The impacts associated with implementation of the proposed action would not disproportionately affect any minority or low-income population or community.
- § Implementation of the proposed action would not result in any identified effects that would be specific to any minority or low-income community.

## INDIAN TRUST RESOURCES

The Department of the Interior requires its bureaus to explicitly consider effects of its actions on Indian Trust resources in environmental documents (NPS 2015). The federal Indian Trust responsibility is a legally enforceable obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights, and it represents a duty to carry out the mandates of federal laws with respect to Native American tribes. There are no known Indian Trust resources in the project area, and the lands comprising the park are not held in trust by the Secretary of the Interior for the benefit of Indians due to their status as Indians. Therefore, the impact topic of Indian Trust resources was considered but dismissed from further analysis.

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# CHAPTER 2

## ALTERNATIVES

This environmental assessment/assessment of effect documents the analysis of environmental consequences of the no-action alternative and two action alternatives. The elements of these alternatives are described in detail in this chapter.

### ALTERNATIVE 1: NO ACTION

Under the no-action alternative, the NPS would continue current management of the park's existing trail network and would coordinate with state and local agencies to improve safety of road crossings, as described below and shown on figures 3 and 4.

#### SIGNAGE AND WAYFINDING

The NPS would maintain existing signage, wayfinding, and interpretive information in their current locations. No new wayfinding, informational, or interpretive signage would be installed in the park. Repair and/or replacement of existing signage would continue to be undertaken as needed on a case-by-case basis and as time and funding allow.

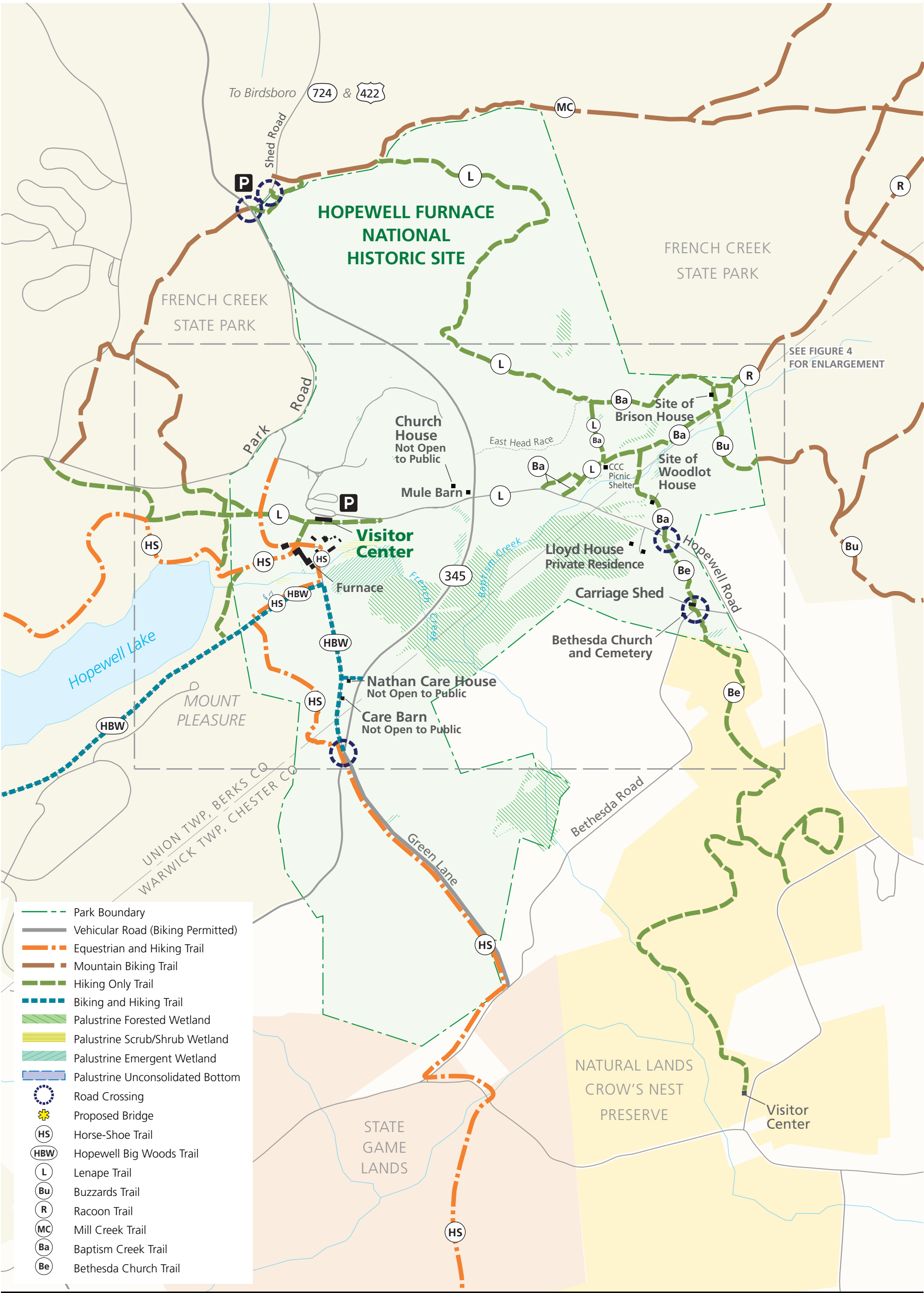
#### TRAILS AND TRAIL USE

The NPS would maintain the existing trail network in its current configuration, as shown on figures 3 and 4. The majority of the park trails would continue to be designated as hiking trails, with the exception of the Horse-Shoe Trail, which would continue to be a shared equestrian and hiking trail, and the existing Hopewell Big Woods Trail segment through the park which would continue to be for bicycle and pedestrian use. Bicycles would continue to be allowed on paved roads within the park and along unpaved Green Lane, as shown on figures 3 and 4. Bicycle use would continue to be common on State Route 345, which is part of one of Pennsylvania's bicycle routes. No changes to current trail use would be implemented under the no-action alternative. No changes would be made to the surface treatments of existing trails, which are shown on figure 5. The only connection between the park's western trails and the eastern trails would continue to be along the road shoulders of Hopewell Road without crossing accommodations at the intersection with State Route 345.

#### ROAD CROSSINGS

Under the no-action alternative, the NPS would initiate coordination with the Pennsylvania Department of Transportation (PennDOT), the state park, the preserve, and Warwick and Union Townships as appropriate to improve the existing roadway crossings for the trail network. These crossings are shown on figures 3 and 4 and include the Lenape/Mill Creek Trails crossing of Shed Road and State Route 345; the Horse-Shoe Trail crossing of State Route 345; and the Bethesda Church Trail crossings of Hopewell Road and Bethesda Road. Specific improvements to these

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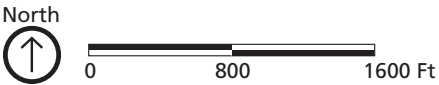
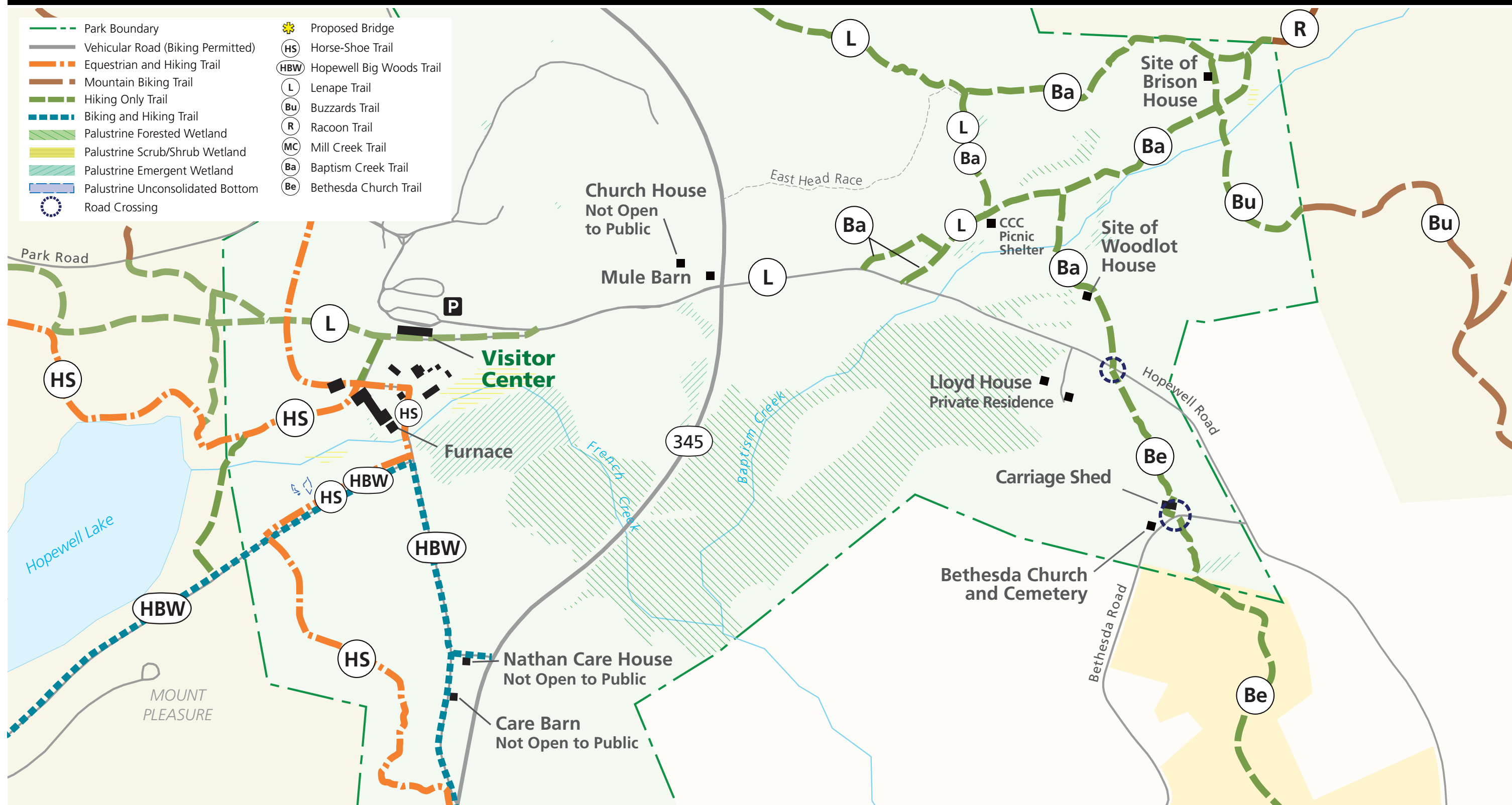


FIGURE 3  
Alternative 1: No-Action Overview



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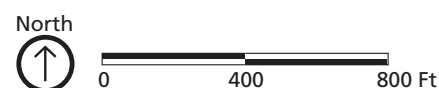
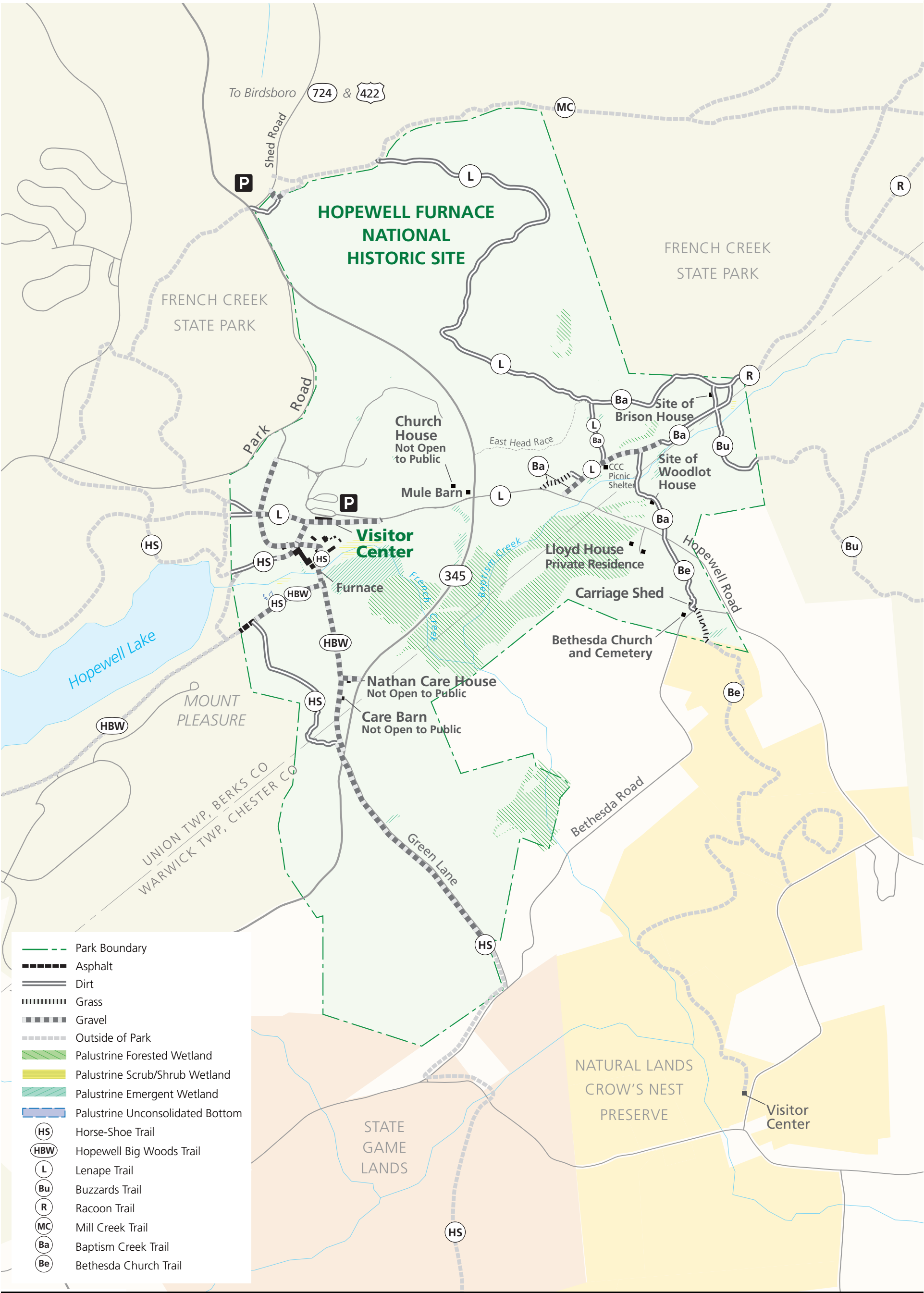


FIGURE 4  
Alternative 1: No-Action Enlargement



- Park Boundary
- ==== Asphalt
- ==== Dirt
- ||||| Grass
- ==== Gravel
- Outside of Park
- ▨ Palustrine Forested Wetland
- ▨ Palustrine Scrub/Shrub Wetland
- ▨ Palustrine Emergent Wetland
- ▨ Palustrine Unconsolidated Bottom
- Ⓜ HS Horse-Shoe Trail
- Ⓜ HBW Hopewell Big Woods Trail
- Ⓜ L Lenape Trail
- Ⓜ Bu Buzzards Trail
- Ⓜ R Racoon Trail
- Ⓜ MC Mill Creek Trail
- Ⓜ Ba Baptism Creek Trail
- Ⓜ Be Bethesda Church Trail

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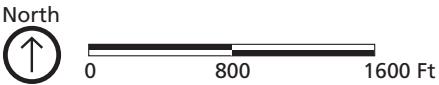


FIGURE 5  
Existing Trail Surface Treatments



crossings would be subject to the above-mentioned coordination because roadway improvements are primarily the responsibility of PennDOT and/or municipalities having jurisdiction. Improvements may include advance warning beacons, flashing warnings, clearing for sight distance, and pavement markings. However, the specific design of any crossing improvements would be determined during future phases of the project in coordination with the appropriate jurisdiction(s). Any additional required compliance for the improvements would be completed at that time.

## **ALTERNATIVE 2: ENHANCED PARK EXPERIENCE (PROPOSED ACTION AND NPS PREFERRED)**

Under alternative 2, which is the proposed action and NPS preferred alternative, the NPS would improve the signage and wayfinding throughout the park and create a new recreational hiking trail connecting the western and eastern portions of the park, as described below and shown on figures 6 and 7.

### **SIGNAGE AND WAYFINDING**

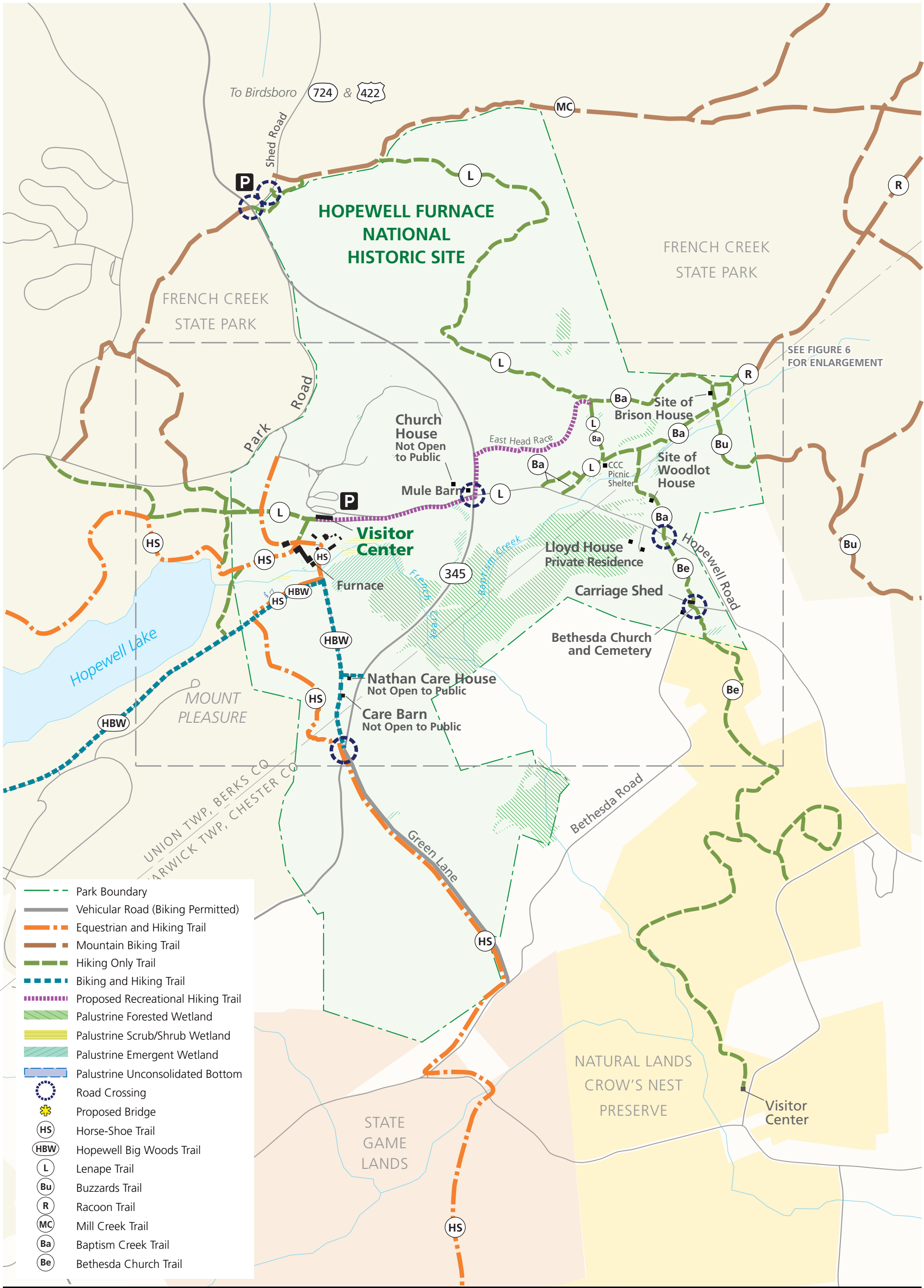
Under alternative 2, the NPS would improve the wayfinding and informational signage throughout the park. All existing trail signage throughout the park would be replaced with new, consistent signage. Existing non-conforming signs would be removed. Specific locations and design for the signage would be determined through a sign plan to be developed during a later project phase. Chosen locations would be subject to archeological testing. Examples of trail signage in other parks that may be used to inform the design of signs in the future sign plan are included in appendix A.

New signage would be installed within the park at all major intersections of park-owned trails providing wayfinding and trail use information. There may be approximately 10 of these types of signs installed within the park, though the exact number would be determined through a future sign plan. Additionally, trail blazes would be updated for clarity and consistency along all existing and proposed trails. The exact number of blazes would be determined through a future sign plan.

Signage would be installed at the park boundary where trails cross between the park and adjacent lands. These signs would clearly inform trail users that they are entering a unit of the national park system. These signs also would provide information on permitted uses on the trail. There may be approximately 10 of these types of signs installed within the park, although the exact number would be determined through a future sign plan.

Informational kiosks would be replaced or installed at trailheads, such as those at the Visitor Center, Shed Road, the Baptism Creek parking area, and along the Horse-Shoe Trail. While the design and specific location would be determined at a later design stage of the project, these kiosks would provide information on wayfinding, trail routes, and permitted uses on each trail. There may be approximately five of these types of signs replaced or installed within the park, although the exact number would be determined through a future sign plan. Alternative 2 also would include increased trail user education and outreach efforts, to clearly communicate desired trail etiquette and to minimize potential conflicts among types of trail users.

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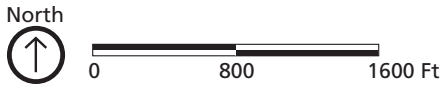
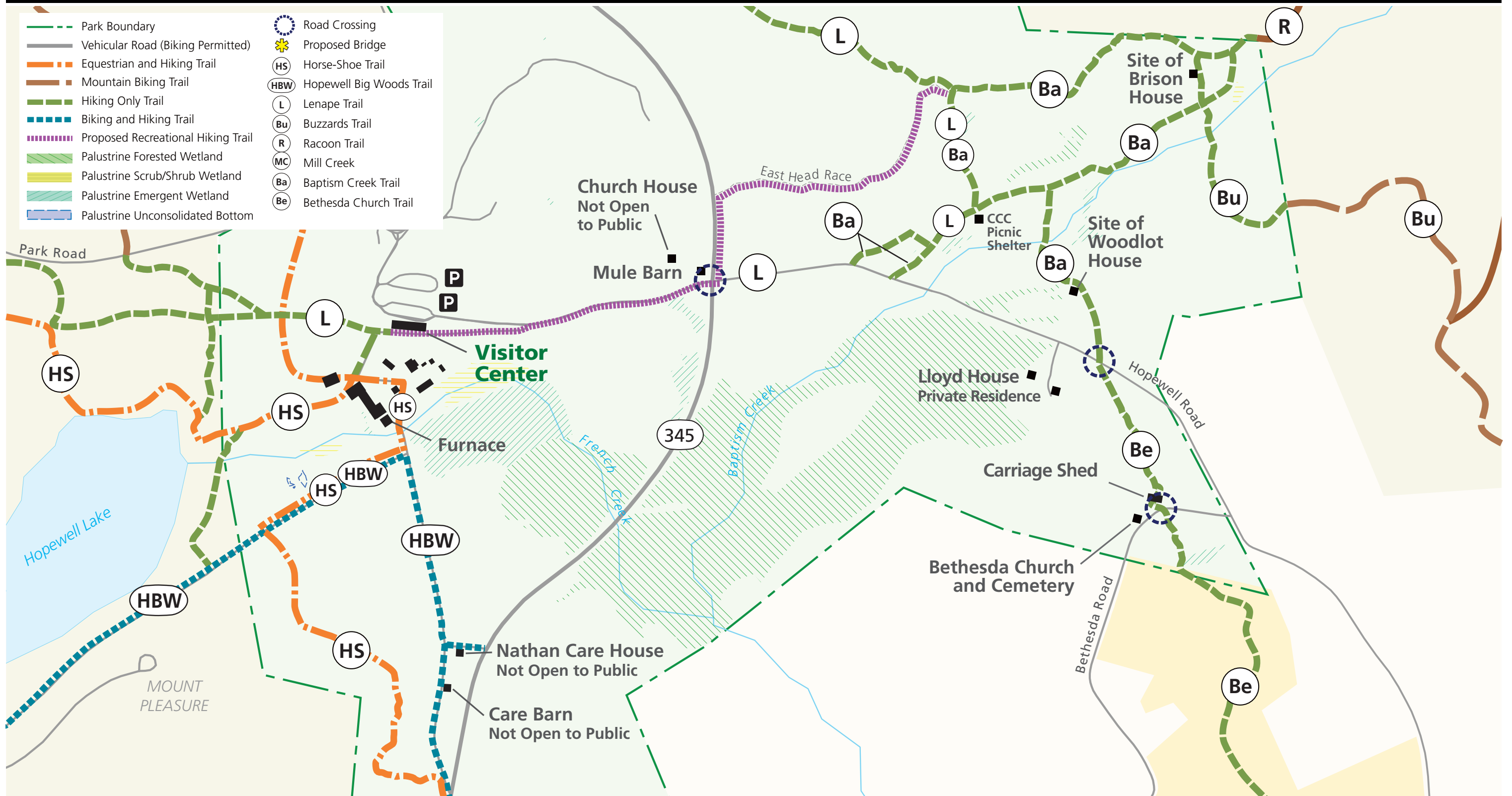


FIGURE 6  
Alternative 2: Enhanced Park Experience Overview



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FIGURE 7  
Alternative 2: Enhanced Park Experience Enlargement

Interpretive opportunities, including interpretive panels, may be added to parts of the trail network as feasible. Alternative 2 could include improvements to existing interpretive signage as well as the addition of new interpretive signage as needed. Exact locations and design of new or improved interpretive panels would be determined through a future design phase of the plan.

Alternative 2 would include limited improvements to existing trails to improve wayfinding at intersections where it is unclear which route is the intended continuation of the trail. At these intersections, unauthorized trails that do not provide a unique experience compared to the main trail would be closed and allowed to revert to natural conditions. Additional wayfinding signage would be installed at these intersections to ensure clarity.

## TRAILS AND TRAIL USE

Under alternative 2, the NPS would create a new recreational hiking trail to provide a pedestrian connection between the western and eastern portions of the park. As shown on figures 6 and 7, the trail would start at the visitor center and travel adjacent to but separated from Hopewell Road on the south side. The trail would cross State Route 345 and then turn north and travel adjacent to but separate from State Route 345 on the east side. The specific location and safety accommodations of the road crossing would be determined during a future design phase, as discussed under the “Road Crossings” section below. The trail would then turn east at the intersection with the East Head Race and follow along the head race, which crosses through an open field that is planted as part of an agricultural lease, until it intersects with the Lenape Trail. The proposed hiking trail would be approximately 0.8 mile in length, would be up to 5 feet wide, and may be treated with an impervious surface. The specific width and surface treatment would be determined during a later design phase and may be a pervious surface having less impacts than analyzed in this environmental assessment/assessment of effect, such as crushed stone or mown grass. The design would be based on the design criteria for a hiking trail as described in appendix B. When determined, the location and design of the proposed new trail would be assessed by an NPS archeologist prior to implementation to determine any necessary archeological fieldwork. The surface treatment having the highest intensity of impacts is analyzed in this environmental assessment/assessment of effect to provide flexibility in the actual surface treatment chosen for implementation. Erosion and sedimentation control measures would be implemented along the proposed trail. Specific measures would be determined during a future design phase and in consultation with an archeologist, but examples include the use of geotextiles, grade reversals, insloped/outslowed treads, or drainage features that limit stormwater runoff. Additional measures are described under the “Mitigation Measures” section below. Implementation of this trail would be contingent upon coordination between the NPS and PennDOT and Union Township as appropriate to ensure proper crossing accommodations are implemented at the trail intersections with State Route 345 and Hopewell Road. Bicycles would continue to be allowed on park, state, and local roads within the park boundaries and along the Hopewell Big Woods Trail segment through the park. All other permitted uses on trails would remain the same as the current conditions described under the no-action alternative and shown on figures 6 and 7.

## ROAD CROSSINGS

Under alternative 2, the NPS would initiate coordination with the Pennsylvania Department of Transportation (PennDOT), the state park, the preserve, and Union and Warwick Townships as appropriate to improve the intersections where trails cross roads, as described under the no-action alternative. Additionally, the proposed hiking trail adjacent to Hopewell Road would be subject to

similar accommodations for crossing State Route 345. Improvements may include advance warning beacons, flashing warnings, clearing for sight distance and visibility (for both drivers and trail users), and pavement markings. However, the specific design of any crossing improvements would be determined during future phases of the project in coordination with the appropriate jurisdiction(s). Any additional required compliance for the improvements would be completed at that time.

### **ALTERNATIVE 3: PARK BIKE EXPERIENCE**

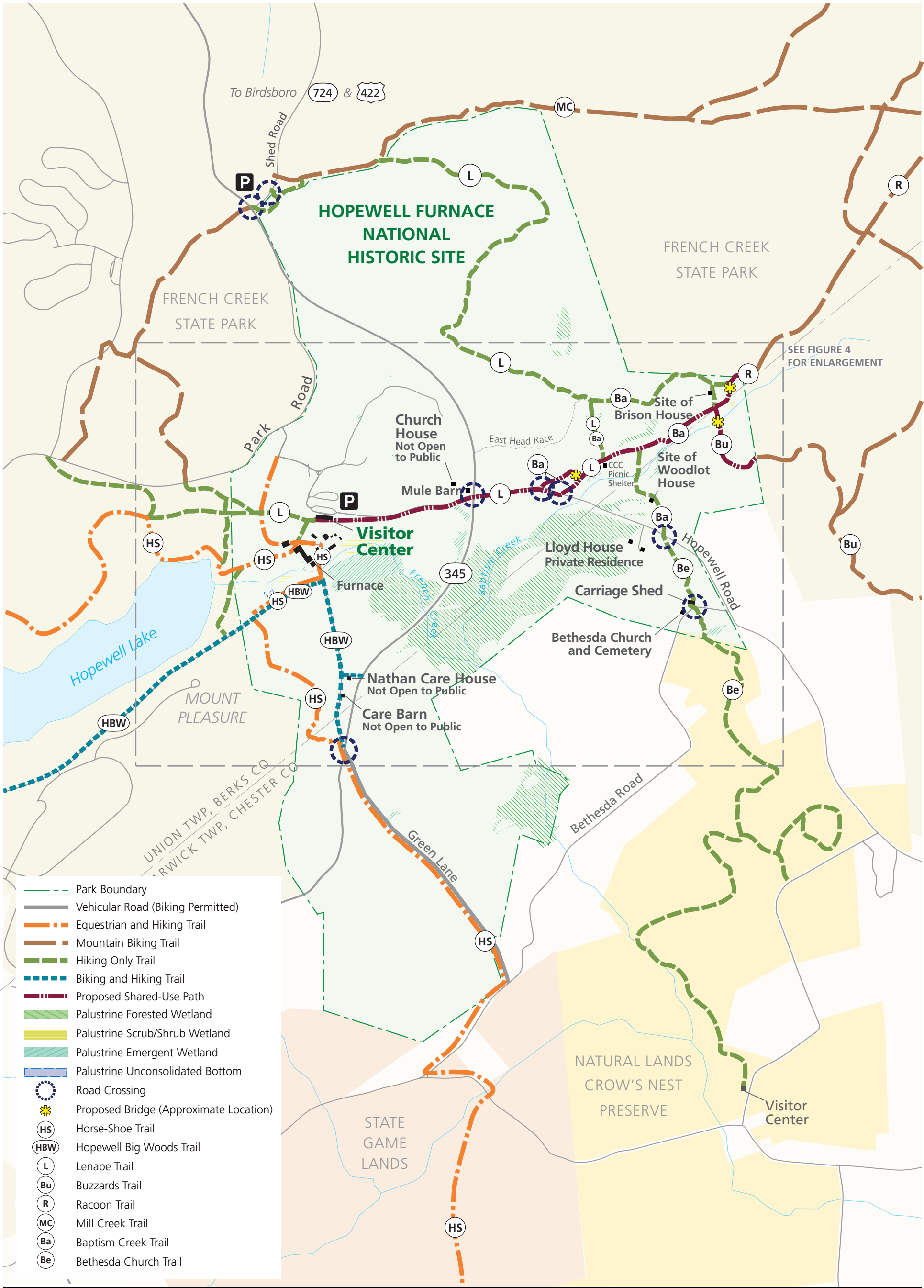
Under alternative 3, the NPS would implement the same improvements to signage and road crossings as described under alternative 2. Additionally, alternative 3 would create a new shared-use path for bicycle and pedestrian connection between the western and eastern portions of the park, as described below and shown on figures 8 and 9.

#### **SIGNAGE AND WAYFINDING**

The improvements to signage and wayfinding throughout the park would be the same as described under alternative 2.

#### **TRAILS AND TRAIL USE**

Under alternative 3, a shared-use path would be created to provide a bicycle and pedestrian connection between the western and eastern portions of the park. As shown on figures 8 and 9, the path would start at the visitor center following, adjacent to but separated from, Hopewell Road on the south side. The path would cross State Route 345 and would continue adjacent to but separated from Hopewell Road until it crosses Hopewell Road and connects with and continues on portions of the existing Baptism Creek National Recreation Trail, as well as portions of the Lenape, Raccoon, and Buzzards Trails in the Baptism Creek area of the park. The specific location and safety accommodations of the road crossings would be determined during a future design phase, as discussed under the “Road Crossings” section below. This shared-use path would be approximately 1.4 miles in length, would be up to 10 feet wide, and may be treated with an impervious surface. The existing portions of the trail would be evaluated for conformity to the design criteria for shared-use paths as described in appendix B and for conformity with slope requirements of 36 CFR 4.30, NPS Final Bicycle Rule. The trail would then be modified if required and as feasible given existing topographic and other conditions. The specific width and surface treatment of the trail would be determined at a later design phase and may be of a surface treatment having less impacts, as described under alternative 2. When determined, the location and design of the proposed new trail and modifications of the existing trails would be assessed by an NPS archeologist prior to implementation to determine any necessary archeological fieldwork. The design would be based on the design criteria for a shared-use path as described in appendix B, within the limitations posed by existing topography and other conditions. Erosion and sediment control measures would be implemented along the proposed path, as described above under alternative 2 and under the “Mitigation Measures” section below. Specific measures would be determined during a future design phase and in consultation with an archeologist. Implementation of this path would be contingent upon coordination between the NPS, PennDOT, and Union and Warwick Townships to ensure proper crossing accommodations are implemented. Under alternative 3, all other uses permitted on existing trails would remain the same as the current conditions described under the no-action alternative and shown on figures 8 and 9.



Hopewell Furnace National Historic Site  
Trail Plan and Environmental Assessment/Assessment of Effect

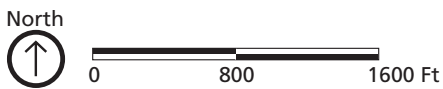
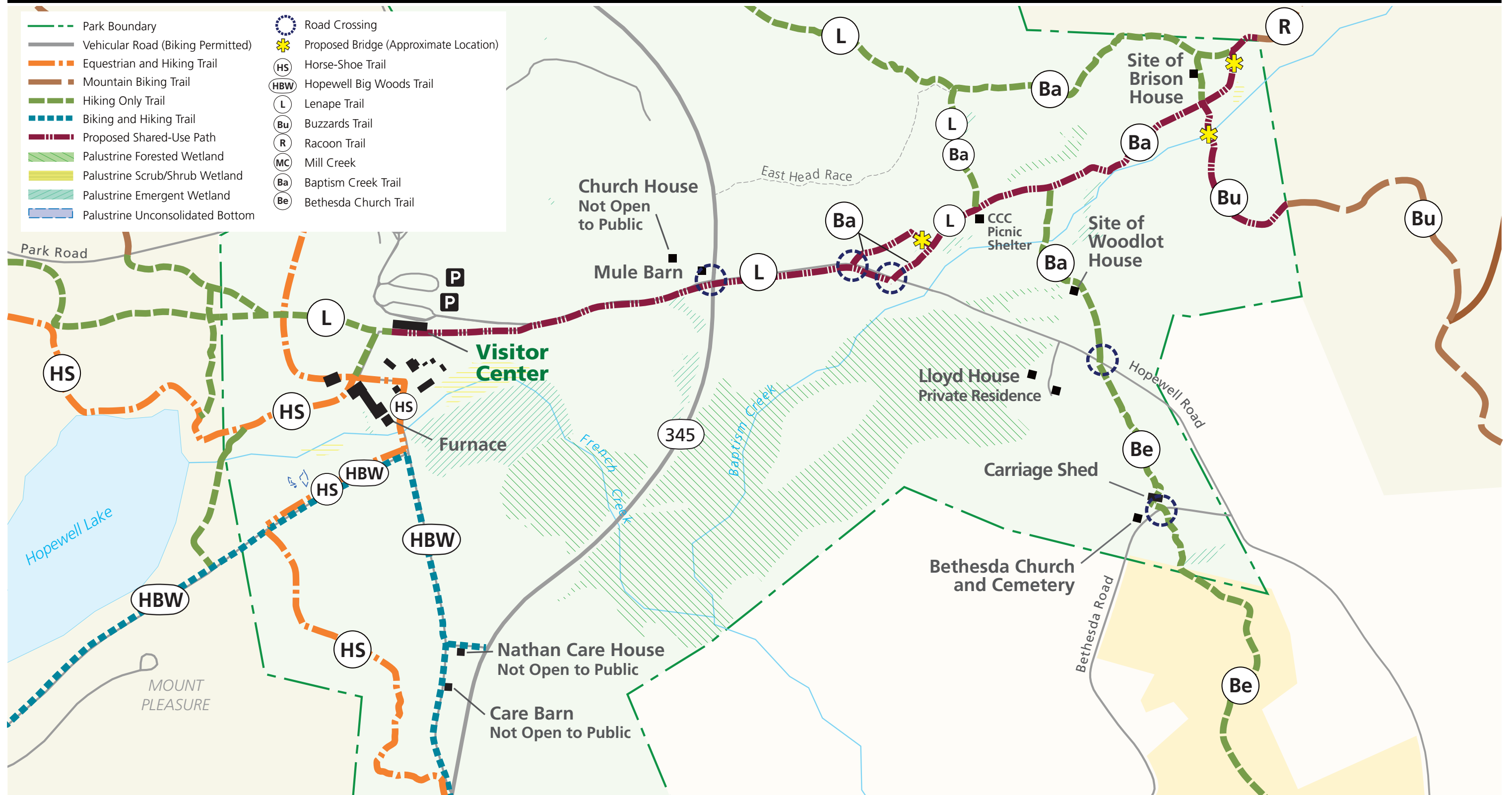


FIGURE 8  
Alternative 3: Park Bike Experience Overview



Hopewell Furnace National Historic Site  
Trail Plan and Environmental Assessment/Assessment of Effect

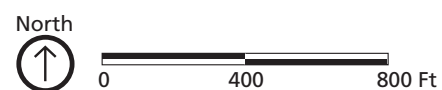


FIGURE 9  
Alternative 3: Park Bike Experience Enlargement

Several existing wooden bridges facilitate crossings of wetlands and streams along the trails of the proposed shared-use path in the Baptism Creek area. There are two bridges along these trails that would need to be replaced with new bridges that would support bicycle use. Bridges would be replaced in the existing locations and would use the existing abutments to the extent practicable. An additional bridge would be constructed where the Buzzards Trail crosses Baptism Creek without an existing bridge. The bridges would be up to 14 feet wide with handrails up to 54 inches high to conform to the American Association of State Highway and Transportation Officials *Guide for the Development of Bicycle Facilities*. The bridges would be of a composite material that mimics the appearance of wood but requires less maintenance than timber. Ground disturbance associated with installing these bridges would be assessed by an NPS archeologist beforehand to determine any necessary archeological fieldwork. An NPS archeologist would monitor the removal and replacement activities.

The design criteria of a shared-use path as described in appendix B would meet the requirements of 36 CFR 4.30, NPS Final Bicycle Rule by providing a sustainable trail design that minimizes user conflicts and considers user safety through appropriate width and sight distances. The location and specific design of the trail would also protect natural and cultural resources as discussed in the impacts analysis in chapter 3 below. Rough costs for construction and life cycle maintenance of the trail were developed to meet the requirements of 36 CFR 4.30. The net estimated construction cost in 2018 dollars is \$1,269,713, with an estimated maintenance cost of \$115,420 over 25 years based on the annual cost for sign repair and replacement, pavement repair, and bridge inspection and maintenance.

## ROAD CROSSINGS

Actions to improve road crossings would be the same as under alternative 2, plus an additional location for crossing accommodations for the proposed shared-use path at Hopewell Road to the Baptism Creek National Recreation Trail (figures 8 and 9). Specific improvements to these crossing would be subject to the coordination discussed under alternative 2. Improvements may include advance warning beacons, flashing warnings, clearing for sight distance, and pavement markings. However, the specific design of any crossing improvements would be determined during future phases of the project in coordination with the appropriate jurisdiction(s). Any additional required compliance for the improvements would be completed at that time.

## MITIGATION MEASURES OF THE ACTION ALTERNATIVES

To minimize environmental impacts related to the action alternatives, the NPS would implement mitigation measures whenever feasible. Although the exact mitigation measures to be implemented would depend upon the final design and approval of plans by relevant agencies, the following is a list of actions that could take place:

- § Instruct construction employees on the sensitivity of the general environment and monitor their activities. Corridors for construction vehicle movement would be established and defined on the ground. Staging of construction equipment would be restricted to the road corridor, parking lots, and other identified previously disturbed areas to avoid impacts on natural and cultural resources.

- § Fence all work areas in order to keep related disturbances within an NPS-defined and minimal impact area. In particular, clearly delineate wetlands in the vicinity of construction corridors to keep related disturbances away from the wetlands. State all protection measures clearly in the construction specifications and instruct workers to avoid conducting activities beyond the fenced construction zone.
- § Implement standard noise abatement measures during construction. Standard noise abatement measures could include the following elements: a schedule that minimizes impacts on adjacent noise-sensitive uses, the use of the best available noise control techniques wherever feasible, the use of hydraulically or electrically powered impact tools when feasible, and location of temporary noise sources as far from sensitive uses as possible.
- § Use the minimum size equipment needed to complete the actions laid out in the alternatives. Hand digging and other minimally intrusive methods may be specified to minimize damage to natural and cultural resources. Any digging activities are to be assessed by an NPS archeologist beforehand to determine the necessary archeology fieldwork.
- § Clearly identify wetlands in the vicinity prior to any construction. Construction entrance(s) would be constructed at key locations to avoid transfer of sediment offsite. Tree protection fencing would be installed to clearly delineate the limits of construction and to protect any trees not being removed during construction. Silt fence would be constructed to collect silt downslope from the construction site prior to any ground disturbance. Silt fence would be inspected, maintained, and kept in working order to ensure proper function. Any measures requiring ground disturbance are to be assessed by an NPS archeologist beforehand to determine the necessary archeological fieldwork.
- § Place geotextile fabric and gravel on the trail surface as soon as rough grading has been completed to avoid any major erosion. Temporary seeding would be required for areas exposed for a period of more than 14 days.
- § Appropriate erosion matting will be installed at any side slopes steeper than 3:1. Temporary erosion control measures will remain in place until the site is stabilized and approved by the park.
- § Minimize soil erosion by limiting the time that soil is left exposed and by applying other erosion control measures such as erosion matting, silt fencing, and sediment basins in construction areas. Temporary erosion control devices or methods shall be used to protect sensitive areas, particularly wetlands and stream corridors. Any measures requiring ground disturbance are to be assessed by an NPS archeologist beforehand to determine the necessary archeological fieldwork.
- § Apply top soil and permanent seeding to any ground disturbed during construction not receiving pavement or other surface material to minimize erosion and sedimentation after construction is completed. Native grasses and other native species previously approved by the park will be used.
- § Implement erosion and sediment control measures along segments of new trails that run in close proximity of wetlands. Examples of erosion and sediment control measures include grade reversals, the use of geotextiles, insloped/outsloped treads, or drainage features that limit stormwater runoff draining into the wetlands. Any measures requiring ground disturbance are to be assessed by an NPS archeologist beforehand to determine the necessary archeological fieldwork.
- § Implement measures to prevent invasive plants from being introduced to the project area such as ensuring that construction-related equipment arrives at the site free of mud or seed-bearing materials and certifying that all seeds and straw material are weed-free.

- § Evaluate any areas identified for ground disturbance prior to implementation of any ground-disturbing activity to determine the presence or absence of archeological resources. Evaluation would consist of examination and analysis of geographical and historical variables using geographical information systems (GIS), archeological monitoring of ground-disturbing activities, and/or archeological survey. Systematic archeological survey would consist of a standard Shovel Test Pit survey at 7.5m intervals in the area to be disturbed. Any archeological deposits and features discovered during these surveys would be delineated and protected during implementation of management actions.
- § Develop a programmatic agreement among the NPS, the Pennsylvania Bureau for Historic Preservation (State Historic Preservation Office), and associated Native American tribes as appropriate to provide a process for design review and archeological testing prior to implementation of any project elements requiring additional design.
- § Conduct tree and limb removal or use of heavy machinery, if required, between August 15 and May 15 to avoid disturbances to the maternity colonies of the Indiana bat and the northern long-eared bat, as well as nesting migratory birds. During future project phases, if it is determined that clearing or construction is needed outside of this season, the NPS would follow previously established tree removal standard operating procedure for the park (approved as part of formal section 7 consultation with the US Fish and Wildlife Service) or initiate consultation with the US Fish and Wildlife Service if needed.
- § Limit the use of heavy equipment and excavation work within 300 feet of known bog turtle habitat to November through March. If work is required outside of this time frame, install exclusion fencing to avoid disturbance to the habitat.

## **ALTERNATIVE ELEMENTS CONSIDERED BUT DISMISSED FROM FURTHER ANALYSIS**

Several alternative elements were identified during the design process and internal and public scoping. Some of these were determined to be unreasonable, or much less desirable than similar options included in the analysis and were therefore not carried forward for analysis in this environmental assessment. The descriptions below summarize the alternative elements that were considered but dismissed from further analysis and the rationale behind the dismissal.

### **RECREATIONAL MOUNTAIN BIKE TRAILS**

During the initial planning process, the NPS considered providing visitors a mountain biking experience by opening some existing hiking trails within the park to recreational mountain bike use. Trails considered for this new use were those trails with existing connections to mountain biking trails within the adjacent French Creek State Park such as the Lenape Trail, the Buzzards Trail, and the Raccoon Trail. Allowing mountain biking on these trails within the park would create mountain biking loops that would provide a more interconnected experience for visitors already using mountain bikes in the state park. However, 30 CFR 4.30 requires the NPS to consider the sustainability of trails on which biking is a permitted use. According to those regulations, the maximum trail grade should be no greater than 15 percent to ensure trails are sustainable. An NPS review of topographical maps show grades of up to 20 percent along the Lenape Trail. Reconfiguring the trail to have lower grades would require substantial changes to the trail and adjacent land, including tree clearing and ground disturbance. Reconfiguring these trails would also change historic circulation patterns and diminish the historic character because the Lenape, Raccoon, and Buzzards

Trails were constructed during the Civilian Conservation Corps Era and are considered contributing resources to the cultural landscape (KFS 1997). The substantial ground disturbance required for reconfiguring these trails may also result in disturbance to intact archeological resources that may be present in the area. Adding mountain biking as a use to these trails may also result in conflicts between hikers and cyclists and would detract from the unique experience of hiking along these narrow, quiet trails. NPS determined that these potential adverse impacts on the cultural landscape, archeological resources, and visitor use and experience would be unacceptable. In addition, the park was established to preserve its resources related to the role the furnace played in early industrialization of the United States (NPS 1972). Mountain biking as a recreational activity is not part of the park's purpose nor is it complementary to the park's significance. *NPS Management Policies 2006* states that the NPS will only allow uses that are "appropriate to the purpose for which the park was established, and can be sustained without causing unacceptable impacts" (NPS 2006). Therefore, providing a mountain biking experience to visitors was dismissed from further analysis.

# **CHAPTER 3**

## **AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES**

This chapter of the environmental assessment describes existing environmental conditions in the areas potentially affected by the alternatives evaluated and the environmental impacts that could result from implementing each alternative.

### **GENERAL METHODOLOGY FOR ANALYZING IMPACTS**

In accordance with the CEQ regulations, direct and indirect impacts are described under each impact topic (40 CFR 1502.16), and the impacts are discussed in terms of context and intensity (40 CFR 1508.27). Where appropriate, mitigating measures for adverse impacts are also described and incorporated into the evaluation of impacts. The specific methods used to analyze impacts for each resource may vary; therefore, these methodologies are described under each impact topic. For all impact topics, the geographic study area is generally defined as the project area, as shown on figure 1.

### **CUMULATIVE IMPACTS ANALYSIS**

Cumulative impacts are defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions” (40 CFR 1508.7). Cumulative impacts are analyzed by adding the impacts of other actions to those of the alternatives described in this environmental assessment/assessment of effect. The following describes the past, present, and reasonably foreseeable actions that contribute to the cumulative impacts on park resources that would be affected by the alternatives.

#### **Past, Present, and Reasonably Foreseeable Actions**

The following action was determined to be a potential contributor to the cumulative impacts on the affected resources in conjunction with the potential impacts of the alternatives presented in this document.

**Hopewell Big Woods Regional Trail.** The park is located within a region informally called Hopewell Big Woods, which is the largest unbroken forest in southeastern Pennsylvania and a major regional recreation destination. The Hopewell Big Woods Trail is a planned new regional trail with

the goal of connecting the Schuylkill River Trail north of French Creek State Park to other regional trails and destinations within Hopewell Big Woods. The Hopewell Big Woods Trail is a multiuse trail that generally permits bicycle and pedestrian use. A segment of the Hopewell Big Woods Trail crosses through the park along existing trails, as shown on figures 3 and 4. It enters the park from the French Creek State Park Boundary south of Hopewell Lake, connects to the Horse-Shoe Trail heading east, then heads south through the Lower Village, past the Nathan Care House to Route 345. An additional segment through the park is planned to continue the trail from that segment across Route 345 and along the existing Green Lane heading south into the State Game Lands (Schuylkill Highlands Partnership 2013). To complete this planned segment, Green Lane would be resurfaced, likely with crushed stone, and features to manage stormwater runoff would need to be installed. Currently, bicycles, pedestrians, and equestrians are permitted on this trail, and those uses would continue with the completion of this segment. When the Green Lane segment is completed, the Hopewell Big Woods Trail would provide a connection with multiuse accommodations between existing trail systems through public lands including French Creek State Park, Hopewell Furnace National Historical Site, and the State Game Lands.

## VISITOR USE AND EXPERIENCE

### AFFECTED ENVIRONMENT

Visitors to the park come to experience an early American iron-making village that played a key role in transforming the United States into an industrial giant. The park received approximately 49,906 visitors in 2017, and has averaged approximately 50,000 visitors per year over the past decade (NPS 2018). Management estimation suggests that the primary destination for most of those visitors is the historic village, where visitors can tour the furnaces, ironmaster's mansion, blacksmith's shop, schoolhouse ruins, and other elements of the iron making operation (NPS, Blackburn, personal communication, 2016a). The park's 12-mile trail network is connected to the village but extends throughout the park. The trails are primarily open for hiking use only; although approximately 1.7 miles also are open to equestrian use on the Horse-Shoe Trail, as shown on figure 3. Bikes are permitted in the park on paved and unpaved roads that are open to vehicles, as well as along a 0.6-mile section of the Hopewell Big Woods trail shown on figure 3. In addition, many park trails are cross-jurisdictional and connect to trails on adjacent public lands, including French Creek State Park, Natural Lands' Crow's Nest Preserve, and State Game Lands. These trails include sections of the Lenape Trail, Raccoon Trail, Buzzards Trail, Horse-Shoe Trail, and Bethesda Church Trail.

Because many trails traverse jurisdictions, park visitors using the trail network can easily cross into adjacent public lands, as shown on figure 3. Signage at these crossings often is inadequate to clearly communicate to trail users that they are crossing a jurisdictional boundary and that permitted uses may change. For example, French Creek State Park surrounds Hopewell Furnace on three sides, and maintains more than 35 miles of trails, many of which are mountain biking trails. As shown on figure 3, several of these state park mountain biking trails connect to trails in Hopewell Furnace, where mountain biking is not permitted, including the Lenape Trail, Raccoon Trail, and Buzzards Trail. A visitor on a mountain bike on the Buzzards Trail in French Creek State Park might not know when they passed onto Hopewell Furnace land, where mountain biking is no longer permitted on that trail.



Permitted use sign and trail blaze posted on a tree

In addition to signage at park boundaries, general wayfinding and informational aids (including trail signage and trail maps) are currently limited and often are unclear and/or inconsistent. Existing wayfinding aids include blazes, wooden trail markers and posts, informational kiosks at some trailheads, and regulatory signs describing permitted trail uses. Existing signage and trail maps lack clear information about what uses are allowed on each trail, specific routes of each trail, and trail connections to other areas of the park and to adjacent public lands. Many signs are weathered and need replacement. Some signs are too small or are located in areas easily overlooked by trail users. Visitors interested in experiencing the park trail network face a confusing situation, which has been noted by several past trail studies, including the 2007 Trails Assessment conducted by the International Mountain Biking Association (IMBA 2007) and the Alternative Transportation Study conducted by the John A. Volpe National Transportation Systems Center of the US Department of Transportation (US DOT 2009).

Outside the historic village, there are relatively few interpretive exhibits for visitors using the trail network and the exhibits that do exist are in poor repair. For example, there are interpretive panels in the Baptism Creek area with information about the 1930s Civilian Conservation Corps activities in the area. The panels interpret some of the extant structures from this time, including a covered picnic shelter and remains of stone fireplaces. However, the exhibits are weathered and limited in information. Additionally, some are located in areas that may be overlooked by trail users.

In several locations, park trails cross major roads without safety accommodations. These road crossings currently have poor sightlines and lack crosswalks or other visual cues for drivers. Crossings of particular concern include the crossing of State Route 345 and Shed Road at the trailhead parking area near the Lenape Trail, the crossing of State Route 345 by the Horse-Shoe Trail to Green Lane, and the crossing of Hopewell Road by the Bethesda Church Trail. In addition, a section of the Lenape Trail connects to and follows along Hopewell Road, where pedestrians are required to share the road with drivers and bicyclists without separation or other accommodations.

## METHODOLOGY

Potential impacts on visitor use and experience are assessed based on changes to the way people use the park, as well as how the alternatives would alter visitors' experiences. The NPS strives to provide opportunities for



Trail information and interpretive signage at the Baptism Creek area

forms of enjoyment that are uniquely suited and appropriate to the natural and cultural resources found in parks. According to NPS *Management Policies 2006*, recreation related to and enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks (NPS 2006). The current conditions of visitor use and experience, as presented under the “Affected Environment” section above, were compared with the proposed alternatives described in chapter 2 to determine how visitor use and experience would be affected.

## IMPACTS OF ALTERNATIVE 1: NO ACTION

### Direct and Indirect Impacts

Under the no-action alternative, there would be no changes to wayfinding, informational, and interpretive signage in the trail network. Visitors would continue to encounter an inconsistent and incomplete wayfinding network, which would continue to create confusion for the visitor trying to navigate around the trail network. Informational and wayfinding aids would remain limited and unclear and/or inconsistent in terms of sign design, placement, and content on signs and trail markings. Visitors would continue to have difficulty obtaining clear information about what uses are allowed on each trail, exact trail routes, and efficient ways to use the trails to get to other areas of the park or adjacent lands. Trail connections to surrounding public lands would continue to be unclear; jurisdictional distinctions/property boundaries would remain insufficiently marked. In addition, lack of consistent and clear maps under the no-action alternative would continue to result in missed interpretive opportunities and leave many visitors unaware of the ways to explore the park and connect with the history beyond the historic village.

The number of trails in the trail network in the no-action alternative would remain the same, as would the permitted uses on those trails. There would continue to be limited opportunities to explore the park by bike, and visitors would primarily experience the trails on foot. There would be no way for visitors to walk from the visitor center east towards the Baptism Creek trails in the park without walking on Hopewell Road or on the undeveloped roadside.

Under the no-action alternative, the potential road crossing improvements would result in an improvement to the visitor experience in these areas. These crossing accommodations would be coordinated with the jurisdictionally-appropriate entity to improve the safety of visitors crossing the road. Additionally, potential crossing accommodations would likely make visitors feel more comfortable when crossing the roads to connect to park trails. Specific impacts would be dependent upon the improvements chosen for implementation, but the actions would be expected to improve overall visitor safety and comfort within the trail network.

### Cumulative Impacts

Other past, present, and reasonably foreseeable future actions that may result in cumulative impacts on visitor use and experience include the proposed completion of the regional Hopewell Big Woods Trail segment along Green Lane through the park. Completion of this regional trail connection would not include creation of new trails or any changes in trail uses on the park’s existing trails. However, it would offer park visitors slightly improved connections to other public lands, including the State Game Lands and, via area roads, the Crow’s Nest Preserve. The proposed regional trail through the park would improve the access and overall connectivity between the park and surrounding public lands throughout the region. Although the addition of the regional trail connection may bring more recreation visitors to the park, the Hopewell Big Woods Trail is not

expected to meaningfully increase visitation to the park or its trail network. The impacts on visitor use and experience from completion of the Hopewell Big Woods Trail would be slightly beneficial due to the improved access between adjacent public lands. When considered with the action identified above, the no-action alternative would contribute a somewhat adverse impact due to the continued lack of sufficient wayfinding and informational signage but would also contribute a potential slight beneficial impact of the possible road crossing improvements. Therefore, the overall cumulative impact on visitor use and experience would be slightly adverse.

## **IMPACTS OF ALTERNATIVE 2: ENHANCED PARK EXPERIENCE (PROPOSED ACTION AND NPS PREFERRED)**

### **Direct and Indirect Impacts**

Under alternative 2, changes to wayfinding, informational, and interpretive signage in the trail network would change the way visitors connect to the park. Visitors would encounter a more consistent and complete wayfinding network, which would reduce confusion for users of the trail network. Additional informational and wayfinding aids proposed under alternative 2 would create easier navigation of the trail network. Visitors would have clear information about what uses are allowed on each trail, specific routes for each trail, and how to use the trails to connect to other areas of the park. Through improved boundary signage, visitors would be aware when they cross out of or into the park and they would find clear information on permitted uses that may change at those boundaries. In addition, trail maps under alternative 2 would be revised and clarified, providing visitors with clear information about the ways to explore the park resources beyond the historic core. Improved and supplemented interpretive opportunities on the trail network would compound the increased opportunities to connect park visitors with the history of the park beyond the historic village.

Under alternative 2, the addition of a new recreational hiking trail would improve visitors' available means to explore the park. The addition of the new recreational hiking trail would improve the connection from the visitor center and historic village to the trails on the east side of the park. This new hiking trail would improve the visitor experience by separating pedestrians from vehicles and bicyclists on the road, providing a more comfortable and enjoyable experience. It also would improve the visitor experience by providing a new connection for the visitor to the stories of the park outside of the historic village, including that of the East Head Race. Closure of unauthorized trails that do not provide unique experiences beyond that of the main trails may decrease visitors' access to a few points in the park, but would generally improve the visitor experience by increasing the clarity of trail routes and improving wayfinding.

Impacts related to potential road crossing improvements would be the same as described under the no-action alternative.

### **Cumulative Impacts**

Other past, present, and reasonably foreseeable future actions that may result in cumulative impacts on visitor use and experience include the proposed completion of the regional Hopewell Big Woods Trail segment along Green Lane through the park. Completion of this segment would offer park visitors connections with multiuse accommodations to other public lands including the State Game Lands and, via area roads, the Crow's Nest Preserve. These impacts are described under the no-action alternative. Under alternative 2, the proposed recreational hiking trail would

contribute to the improved pedestrian connectivity throughout the park and with the surrounding public lands, although it would not contribute improved multiuse connectivity. When considered with the action identified above, the beneficial impact of the increased connectivity through the park would contribute slightly to the increased connectivity with other regional trail networks provided by the Hopewell Big Woods Trail. Therefore, the overall cumulative impact on visitor use and experience under alternative 2 would be beneficial.

## IMPACTS OF ALTERNATIVE 3: PARK BIKE EXPERIENCE

### Direct and Indirect Impacts

Under alternative 3, the impacts on visitor use and experience related to improved wayfinding, informational, and interpretive signage; introducing bicycle use on select park trails; and potential road crossing improvements would be the same as described under alternative 2.

Under alternative 3, impacts on visitor use and experience related to trail uses would occur. This alternative would offer park visitors a new trail experience by adding a shared-use path for pedestrians and bicyclists that connects the visitor center with the Baptism Creek area, through to the mountain biking trails in French Creek State Park. This shared-use path would continue along trails in the Baptism Creek area, including the Baptism Creek National Recreation Trail and the Raccoon Trail. The shared-use path would improve the visitor experience by separating pedestrians and bicyclists from vehicles on Hopewell Road, thereby providing a more comfortable and enjoyable experience than walking or biking on a busy road. The new shared-use path would also improve the experience of bicyclists in the park by providing an opportunity to cycle uninterrupted from the visitor center to the trails on the eastern side of the park and connect to mountain biking trails in French Creek State Park.

Adding recreational bike use to the trails shown on figures 8 and 9 would allow visitors, including families, new ways to travel through parts of the park and would improve connectivity of the visitor center and the historic village to the adjacent state park and area trails. This trail would also allow cyclists heading west from the state park mountain biking trails to NPS trails to safely remain on their bikes without dismounting. Although the shared use path would have the potential to create visitor conflicts between bicyclists and hikers, it would be designed to accommodate both hikers and cyclists by conforming to the design criteria in appendix B, which would minimize these conflicts through appropriate widths and sight lines. Additionally, education of trail users via informational signage, as described in the “Alternatives” chapter above, would promote proper trail use and trail etiquette. In addition, bicycle use may detract from some hikers’ experience of walking along a quiet trail in the park, though other trails would remain available for these hiking-only experiences.

### Cumulative Impacts

Other past, present, and reasonably foreseeable future actions that may result in cumulative impacts on visitor use and experience include the proposed completion of the regional Hopewell Big Woods Trail segment along Green Lane through the park. Completion of this segment would offer park visitors connections with multiuse accommodations to other public lands including the State Game Lands. These impacts are described under the no-action alternative. Under alternative 3, the proposed shared-use path would contribute to the improved access and connectivity throughout the park and with the surrounding public lands. The alternative may also contribute an adverse impact on hikers if their experience is diminished by sharing the trail with cyclists. When

considered with the action identified above, the beneficial impact of the improved multiuse connectivity through the park would contribute to the increased connectivity with other regional trail networks provided by the Hopewell Big Woods Trail, though the diminished experience of hikers would contribute a slight adverse impact. Therefore, the overall cumulative impact on visitor use and experience under alternative 3 would be slightly beneficial.

## CONCLUSION

The no-action alternative would result in a continuation of existing challenges with clearly communicating the trail network routes, uses, and connections to visitors. These challenges would continue to result in adverse impacts on visitor use and experience of the trail network. However, the park's purpose and significance is related to telling the history of the furnace operation; providing a strictly recreational experience is not the park's legislatively authorized purpose. Under the no-action alternative, visitors would continue to enjoy the park's trail network as it exists today and experience the history associated with the park and its resources. The potential improvements to road crossings would promote a more comfortable and enjoyable experience for visitors. The no-action alternative would conform to NPS *Management Policies 2006* by providing recreation related to park resources and values. The park's resources would continue to represent the significance for which the park was established: the historic furnace and its role in American industrialization, and visitors would continue to be able to enjoy interpretive, educational, and recreational activities related to that significance.

Alternatives 2 and 3 would result in beneficial impacts on visitor use and experience due to the improved wayfinding and informational signage, increased interpretive opportunities, improved connectivity throughout the trail network, and new trails and trail uses. Improved signage in both alternatives 2 and 3 would allow visitors to more fully experience the park and park resources by having access to clear information about what is available and how to get there via park trails. Opportunities for new interpretive experiences throughout the trail system would allow visitors to more fully understand and experience the park's history while enjoying recreational activities. Alternative 2 would provide a more enjoyable pedestrian connection between the visitor center area of the park and the Baptism Creek area and trail system on the west side of the park. Alternative 3 would expand that connection to bicyclists, including families, as well as pedestrians. Cyclists on the shared-use path under alternative 3 may detract from hikers using the trail if conflicts arise. Overall, alternatives 2 and 3 would improve the visitor experience of park resources, not only through recreation along the trails but also through opportunities for learning about how the historic resources throughout the park connect to support the furnace operation in the 18th and 19th centuries and/or the Civilian Conservation Corps activities in the 20th century. Both alternatives 2 and 3 would allow the NPS to better provide recreation related to park resources and values, as called for in NPS *Management Policies 2006*. Because the telling of a more complete story of the furnace and its resources outside of the historic village would be possible under alternatives 2 and 3, the NPS would be able to use park resources to better express the purpose and significance for which the park was established.

## CULTURAL LANDSCAPE AND HISTORIC STRUCTURES

### AFFECTED ENVIRONMENT

Hopewell Furnace National Historic Site is listed in the National Register and is significant for its role in the iron industry throughout the 18th and 19th centuries. The cold-blast, charcoal-fueled iron furnace operated between 1771 and 1883. The location of the furnace was well suited for iron production due to the proximity of raw materials. Iron ore and limestone were mined from properties in which the historic business owned interest. Charcoal was produced from nearby forests, and water was obtained from nearby streams (NPS 1985).

Today, the 848-acre Hopewell Furnace National Historic Site constitutes less than 20 percent of the lands historically associated with the furnace. Much of those lands are now part of French Creek State Park. However, the park maintains elements representative of all aspects of the iron-making process (KFS 1997). The park's historic village—which showcases the iron furnace—includes a reconstructed charcoal-fueled furnace complex, the ruins of an anthracite furnace, the ironmaster's mansion and associated outbuildings, tenant houses, and barns. A mixed industrial, domestic, and agricultural landscape surrounds the village and makes up the majority of the mostly wooded park. Surrounding the historic village are agricultural fields and farmsteads historically associated with the furnace and a large forested area that provided fuel for the furnace. During its operation, the entire area was used to extract resources out of the land in order to operate the furnace. Furnace workers created a network of routes for hauling lumber and charcoal throughout the lands associated with the furnace. Today, some of these historic routes have been designated as pedestrian and equestrian trails for visitor use throughout the park.

During operation of the furnace, two head races were created to divert water from three streams to power the waterwheel and for domestic, livestock, and agriculture needs. The West Head Race extended approximately 2 miles from the west to the furnace and was likely constructed prior to 1800 (KFS 1997). The East Head Race (a portion of which is shown on figures 3 and 4) extended approximately 1 mile from Baptism Creek to the furnace and is thought to have been constructed circa 1770 (KFS 1997). The East Head Race consisted of an open ditch with stone retaining walls along slopes, likely lined with clay to reduce loss of water (KFS 1997). The East Head Race was mapped and partially restored by the Civilian Conservation Corps in 1938, although it is now dry. Today portions of the existing stone retaining wall serve as a boundary between agricultural fields north of Baptism Creek that are planted as part of an agricultural lease.

Many historic structures associated with the 18th and 19th century furnace remain within the park and are considered to be contributing resources in the National Register listing. These include—among many others—the Furnace, the Nathan Care House, the Lloyd House, the East Head Race, and Bethesda Baptist Church. The park also has representative features of its post-furnace, 20th century history. In the Baptism Creek area, a few of the original buildings and facilities from the 1930s Civilian Conservation Corps picnic area remain. These features include the covered picnic shelter, remains of stone fireplaces, and the parking area, which continues to be regularly mowed (KFS 1997). A complete list of contributing resources is included in appendix C.

The historic circulation network through the park remains generally discernible. Within the core village area, the historic roads are now pedestrian walkways that retain high integrity in terms of

alignment and general appearance (KFS 1997). The Civilian Conservation Corps Era substantially changed circulation throughout the park through construction of the State Route 345 bypass that routed the road around the historic village area, temporary construction access roads for use during their occupation of the area, and the creation of a hiking trail network. Many of the existing hiking trails were created during this period and several are now considered to be contributing resources to the cultural landscape, including the Lenape, Raccoon, and Buzzards Trails (KFS 1997). Some may have followed the historic traces of former charcoal and logging road, but most were likely new trails constructed by the Civilian Conservation Corps (KFS 1997). The existing surface treatment for these trails are generally dirt, although gravel surfaces exist on a few segments. See figure 5 for existing surface treatments of trails throughout the park.

The Baptism Creek area is located on the eastern side of the park. In this area is where in 1936 the Civilian Conservation Corps constructed trails and a large picnic area. This effort included construction of a picnic shelter, approximately 130 picnic tables, 35 fireplaces, several drinking fountains, one vehicular bridge, two pedestrian bridges, and a large parking area (KFS 1997). A majority of the elements constructed during this CCC era have been dismantled or fallen into decay. The parking area is no longer used but is regularly mowed and evident (KFS 1997). The picnic shelter and remnants of many fireplaces and drinking fountains are extant throughout this area. This area continues to be used for recreation in the form of hiking through the trails. The trails are all generally surfaced with dirt and travel through a forested backdrop. Three wooden bridges facilitate crossing of Baptism Creek and though the timber components of the bridges have been replaced in-kind, the original stone abutments from the CCC era are extant at these crossings. One crossing of the Buzzards Trail over Baptism Creek does not have a bridge and requires hikers to ford the creek.



View along the Baptism Creek  
National Recreation Trail

Land use today is substantially different than during furnace operation because iron is not produced, some fields are no longer planted, and woods are no longer logged. However, the land use patterns that once existed are clearly evident in the restored and/or reconstructed buildings of the historic village and in the maintained open fields. Some of the open fields are planted as part of an agricultural lease program. Although the forests no longer show evidence of logging operations, the forested hillsides remain undeveloped and provide similar views from the village core to what existed in the 18th and 19th centuries. The spatial organization of the site has remained largely the same, including large forested areas with pockets of agricultural open spaces, building clusters such as the Bethesda Baptist Church cluster and the Thomas Lloyd House cluster, and the historic village core. Though changes to the park have occurred throughout its history, the cultural landscape report states that, as a whole, the site retains its overall integrity (KFS 1997).

Modern wayfinding and interpretive signage exists throughout the park and though they are considered as non-contributing resources to the landscape, they are important features for visitor

understanding of the park's history and context (KFS 1997). The signage throughout the park is currently inconsistent in terms of design and some signs are in poor condition in need of repair or replacement.



View from Horse-Shoe Trail near the lower village showing landscape of forests and managed open fields

## METHODOLOGY

Potential impacts on historic structures and cultural landscapes are evaluated based on changes to character-defining features of the resources, which are the characteristics of a historic property that qualify the property for inclusion in the National Register. This approach is derived from the *Secretary of the Interior's Standards for Rehabilitation of Historic Buildings*, Director's Order 28: *Cultural Resource Management Guidelines*, as well as the regulations of the Advisory Council on Historic Preservation implementing the provisions of the National Historic Preservation Act. Character-defining features contribute to a property's integrity, which is composed of location, design, setting, materials, workmanship, feeling, and/or association. The current conditions of the cultural landscape, as presented under the "Affected Environment" section above, were compared with the proposed alternatives described in chapter 2 to determine the impacts on the cultural landscape. This section assesses impacts under the National Environmental Policy Act. An NHPA Section 106 assessment of effect on historic properties is presented in a separate section at the end of this chapter.

## **IMPACTS OF ALTERNATIVE 1: NO ACTION**

### **Direct and Indirect Impacts**

Under the no-action alternative, there may be changes to the appearance of the cultural landscape and historic setting due to potential road crossing improvements. Specific impacts would be dependent upon the improvements chosen for implementation, but may include the introduction of new signage, flashing warnings, and other modern elements into the cultural landscape and historic setting. Some crossings would be located near historic structures, such as the Bethesda Church and Cemetery along the Bethesda Church Trail. Improvements at those crossings would somewhat detract from the historic appearance of the landscape and setting of nearby historic structures due to the introduction of modern materials and elements. However, improvements would be limited to road crossings and the change in appearance would be relatively small when compared to the overall historic character that would remain in the cultural landscape and setting of historic structures. Although changes to the setting of individual structures may occur, the changes would not detract from the overall character of the park and would not diminish the overall integrity of the cultural landscape or historic structures in the park.

### **Cumulative Impacts**

Other past, present, and reasonably foreseeable future actions that may result in cumulative impacts on the cultural landscape and historic structures include the proposed completion of the regional Hopewell Big Woods Trail segments through the park. Completion of this regional trail connection would result in some intrusion on the appearance of the cultural landscape and historic structures through the installation of wayfinding signage to guide visitors along the trail. However, the signage would be designed to be as minimally intrusive as possible to minimize visual impacts on the historic character and appearance of the park. This may include incorporating new signage with existing signage to limit new impacts. No new trails would be constructed for this regional trail connection and no new trail uses would be permitted on the park's existing trails. The impacts on the cultural landscape and historic structures from completion of the Hopewell Big Woods Trail connection would be only slightly adverse due to the installation of new signage. When considered with the action identified above, the adverse impact of the introduction of modern elements for road crossing improvements would slightly contribute to the adverse impact of the Hopewell Big Woods Trail. However, these adverse impacts would be collectively very small when compared to the overall historic character and appearance of the cultural landscape and historic structures that would remain. Therefore, the overall cumulative impact on the cultural landscape and historic structures would be minimally adverse.

## **IMPACTS OF ALTERNATIVE 2: ENHANCED PARK EXPERIENCE (PROPOSED ACTION AND NPS PREFERRED)**

### **Direct and Indirect Impacts**

Under alternative 2, the installation of new signage throughout the park would result in changes to the historic appearance of the cultural landscape and setting of historic structures throughout the park. Because the new signs, kiosks, and trail blazes would be visible throughout the park, they may slightly detract from the overall historic character and feeling of the landscape. However, the signs would be designed to be compatible with the historic setting in terms of color, scale, and materials.

Additionally, because existing signs would be replaced with compatible and consistent signage, there may be a somewhat beneficial impact on the appearance of the cultural landscape and historic setting due to the removal of inconsistent existing signage. Possible intrusion on the historic character of the park would be considered during determination of the location for each sign and kiosk. Locations that minimize intrusion on the historic setting while remaining conspicuous for visitors would be chosen for each sign and kiosk.

Alternative 2 would result in changes to the appearance of the cultural landscape and historic setting due to the installation of the proposed hiking trail connecting the visitor center to the existing trails on the eastern side of the park. The introduction of modern materials for the hardened surface treatment would result in noticeable visual changes to the appearance of the cultural landscape and historic setting of historic structures in the vicinity. The segment of the proposed trail that follows along East Head Race would result in substantial visual changes in the vicinity of the East Head Race due to the introduction of trail where one did not historically exist. However, due to topography within the park, the trail would not be highly visible from a distance. Also, the addition of a trail adjacent to the East Head Race would result in a change in circulation patterns within the cultural landscape because the head race was not historically designed for pedestrian circulation. However, these changes would be relatively small when compared to the overall circulation patterns that would remain unchanged throughout the park. The segments of the proposed trail that would run adjacent to Hopewell Road and State Route 345 would result in visual changes due to the introduction of a new trail similar to the segment along the East Head Race, but would not introduce new circulation patterns to those areas. The creation of the proposed trail would not result in changes to historic land use patterns because the trail would follow existing roads and the East Head Race, which serves as a border between managed open fields. The character of the existing managed open fields would not be disturbed by the proposed trail. As discussed in the “Alternatives” chapter above, the specific trail width and surface type would be determined during a later design phase. If, for example, a more narrow trail width is implemented with a more natural surface material, the intrusion into the cultural landscape and setting of historic structures may be of a somewhat lesser intensity if the width and material result in it being less visible and visually detracting from a distance.

The construction and use of a new hiking trail could result in favorable habitat created for the spread of invasive species within the park. Because most invasive species are disturbance-dependent, disturbed trail sides would be vulnerable to invasive species colonization. The spread of invasive species would have the potential to result in changes to the appearance of the historic landscape through the introduction of non-historic vegetation. However, the extent of disturbance would be limited to the length of the proposed trail and mitigation measures would be in place to avoid the introduction of invasive species during construction activities.

Impacts related to the improvement of road crossings would be similar to those described under the no-action alternative but would include additional potential impacts for the crossings of the proposed recreational hiking trail at State Route 345 and Hopewell Road. This crossing would be located in the immediate vicinity of the historic Mule Barn and Church House, and therefore would result in some changes to the historic setting of those structures. As discussed under the no-action alternative, the potential impacts of those changes would depend upon the specific improvements chosen for implementation. However, improvements would be limited to road crossings and the change in appearance would be relatively small when compared to the overall historic character that would remain in setting of historic structures. Additionally, these improvements would not be visible from the historic core of the park, and therefore, would not detract from its historic character or setting.

Temporary visual and noise intrusions on the cultural landscape and historic setting would result from construction activities during implementation. The presence of construction equipment and materials would detract from the overall feeling and appearance of the cultural landscape and historic setting. The greatest intensity of these impacts would likely be along Hopewell Road and East Head Race for the construction of the proposed new recreational hiking trail. However, such intrusions would last only the period of construction, which would be approximately two months.

## **Cumulative Impacts**

Other past, present, and reasonably foreseeable future actions that may result in cumulative impacts on the cultural landscape and historic structures include the completion of the proposed regional Hopewell Big Woods Trail segments through the park. Completion of this regional trail connection would result in some intrusion on the appearance of the cultural landscape and historic structures through the installation of wayfinding signage to guide visitors along the trail. These impacts are described under the no-action alternative. Under alternative 2, the installation of new signage, creation of a new hiking trail, and improvements at road crossings would contribute to the change in historic appearance of the cultural landscape and setting of historic structures. When considered with the action identified above, the adverse impact of the proposed improvements would contribute to the adverse impact of the completion of the Hopewell Big Woods Trail. However, these adverse impacts would be collectively relatively small when compared to the overall historic character and appearance of the cultural landscape and historic structures that would remain. Therefore, the overall cumulative impact on the cultural landscape and historic structures would be somewhat adverse.

## **IMPACTS OF ALTERNATIVE 3: PARK BIKE EXPERIENCE**

### **Direct and Indirect Impacts**

The impacts on the cultural landscape and historic structures related to the installation of new signage and wayfinding information would be the same as described under alternative 2.

Under alternative 3, the proposed shared-use path would result in changes in the appearance of the cultural landscape and historic setting. These visual changes would be similar to those described for the hiking trail under alternative 2 but would result in visual disturbances of a somewhat greater intensity because the shared-use path would be approximately twice as wide and, therefore, would likely be more visible from a distance. The new portion of the shared-use path along the side of Hopewell Road would not only result in a change in appearance, but it would also slightly change the circulation patterns of the area by creating a new path separated from the road. There would be no change in circulation patterns in the Baptism Creek area, however, because the shared-use path would follow existing trails. The widening of the existing trails and the change in surface treatment would result in a change in historic appearance and feeling of the area. Although the surface treatment would be determined during a future design phase, if an asphalt or other hardened surface is implemented along the existing Baptism Creek National Recreation Trail it would change the current appearance and feeling of the wooded area and dirt trail surfaces. However, if a more natural surface than asphalt is chosen for this area, these adverse impacts to the appearance and feeling of the area may be of a lesser intensity than described here.

The replacement and/or installation of three bridges along the proposed shared-use path in the Baptism Creek area would result in a change in appearance of the area. The bridges would be wider

with taller railings than the existing bridges and one would be installed in an area that did not historically have a bridge. Although the bridges would be designed to be compatible with the area in terms of materials, color, and design, they would detract slightly from the historic setting of the trails. The wider bridges would also result in a change in historic massing of the original CCC era bridges; however, the stone abutments, which comprise the remaining historic fabric of the original bridges, would remain in place.

Impacts related to the improvement of road crossings would be similar to those described under the no-action alternative, but would include additional potential impacts for the crossings of the proposed shared-use path across State Route 345 and across Hopewell Road to the Baptism Creek National Recreation Trail. The State Route 345 crossing would be located in the direct vicinity of some historic structures, including the Mule Barn and the Church House, and therefore, would result in some changes to the historic setting of those structures. As discussed under the no-action alternative, the potential impacts of those changes would be dependent upon the specific improvements chosen for implementation. However, improvements would be limited to road crossings and the change in appearance would be relatively small when compared to the overall historic character that would remain in setting of historic structures. Additionally, these improvements would not be visible from the historic core of the park, and therefore, would not detract from its historic character or setting.

## Cumulative Impacts

Other past, present, and reasonably foreseeable future actions that may result in cumulative impacts on the cultural landscape and historic structures include the completion of the proposed regional Hopewell Big Woods Trail segments through the park. Completion of this regional trail connection would result in some intrusion on the appearance of the cultural landscape and historic structures through the installation of wayfinding signage to guide visitors along the trail. These impacts are described under the no-action alternative. Under alternative 3, the installation of new signage, creation of a new shared-use path, installation of new bridges, and improvements at road crossings would contribute to the change in appearance of the cultural landscape and setting of historic structures. When considered with the action identified above, the adverse impact of alternative 3 would contribute to the adverse impact of the completion of the Hopewell Big Woods Trail. However, these adverse impacts would be collectively relatively small when compared to the overall historic character and appearance of the cultural landscape and historic structures that would remain. Therefore, the overall cumulative impact on the cultural landscape and historic structures would be somewhat adverse.

## CONCLUSION

All the alternatives in this trail plan would result in some changes to the appearance of the cultural landscape and the setting of historic structures within the park. The no-action alternative would result in the lowest intensity of adverse impacts because the only changes to the historic appearance would be potential improvements to road crossings. Some crossing improvements would be in the immediate vicinity of some historic structures; however, improvements would be limited to road crossings and the change in appearance would be relatively small when compared to the overall historic character that would remain in the cultural landscape and setting of historic structures. Character-defining features of the cultural landscape, such as patterns of spatial organization, circulation, boundaries, vegetation, buildings and structures, and small-scale elements would not be changed under the no-action alternative. There would be no loss of integrity of the cultural landscape or historic structures, and

there would be no loss of character-defining features for which the park is eligible for listing in the National Register.

Alternatives 2 and 3 would result in greater changes in the appearance of the cultural landscape and the setting of historic structures over the no-action alternative. The new signage proposed throughout the park would result in the introduction of new material and features into the landscape, though they would be designed to be compatible with the historic character of the park in terms of color, materials, and scale. Replacement of existing, inconsistent signage may result in an improvement of the appearance of the cultural landscape and historic setting. Specific locations of each sign would be determined based on minimizing intrusion into the landscape while being informative for visitors. Overall, the new signage would not diminish the historic character of the park's cultural landscape or historic structures in a manner that would result in a loss of integrity.

The introduction of the recreational hiking trail under alternative 2 would result in adverse impacts on the cultural landscape and setting of historic structures by introducing a new linear pedestrian trail. However, the intensity of the change in appearance would be minimized because most of the trail would run along roadsides, and would therefore not interrupt historic land use patterns or overall circulation patterns. Although the segment of trail running alongside the East Head Race would result in a small change to circulation in the park, it would be relatively small when compared to the rest of the circulation pattern, which would be unchanged. Because the East Head Race serves as a boundary between managed open fields, the trail would not change the land patterns that are considered contributing features of the cultural landscape. Additionally, the park's Cultural Landscape Report recommended that the East Head Race be preserved to the extent possible, as both an interpretive element and as a boundary demarcation (KFS 1997). The trail would allow for interpretive opportunities along the head race, which would promote the structure's importance to the furnace operation and assist the NPS in telling the story of the historic site. Character-defining features of the cultural landscape, such as patterns of spatial organization, boundaries, vegetation, buildings and structures, and small-scale elements would not be changed under alternative 2. There would be no loss of integrity of the cultural landscape or historic structures, and there would be no loss of character-defining features for which the park is eligible for listing in the National Register.

The proposed shared-use path under alternative 3 would result adverse impacts on the cultural landscape and setting of historic structures by introducing a new trail. The intensity of the adverse impacts may be greater than under the pedestrian trail proposed under alternative 2 because the shared-use path would be approximately twice as wide and, therefore, more visible from a distance. However, the path would travel adjacent to Hopewell Road, which is already a modern intrusion on the landscape, and not adjacent to the East Head Race, which retains its historic character. Therefore, the shared-use path would result in a lesser change in appearance of Hopewell Road than would the hiking trail adjacent to the East Head Race. The wider shared-use path with a hardened surface through the Baptism Creek area would result in a change in historic appearance and feeling of the area, which would detract from the character of a natural, wooded area. However, specific widths and trail surfaces would be determined during a later design phase and may result in impacts of lesser intensity if the width and materials chosen result in the path being less visible from a distance or being more compatible with the character than what is described here. Character-defining features of the overall cultural landscape, such as patterns of spatial organization, circulation, boundaries, vegetation, buildings and structures, and small-scale elements would not be changed under alternative 3. There would be little loss of integrity of the cultural landscape or historic structures, and there would be no loss of character-defining features for which the park is eligible for listing in the National Register.

## ARCHEOLOGICAL RESOURCES

### AFFECTED ENVIRONMENT

Over 70 archeological surveys and studies have been conducted in and around the park over the past 70 years. An archeological overview and assessment of the park was completed in 2011 and summarizes the findings of those studies (PAL 2011). Documented archeological resources include those from the precontact (pre-AD 1600) period through the 20th century. In addition to the known resources, the park also has the potential to contain currently unknown archeological resources of the same time range. Much of the park has been identified as having either moderate or high sensitivity for precontact or postcontact (post AD 1600) resources (PAL 2011). Additionally, the entire park is identified as an archeological site in the Pennsylvania Archaeological Site Survey.

The majority of the archeological studies conducted in the park were focused on understanding the 18th–19th century furnace. Therefore, the postcontact archeological record within the park is fairly well known. In general, the areas of highest archeological sensitivity are in the vicinity of development and operation of the historic furnace. Artifacts found in those sites are related to domestic activities, furnace operation, and charcoal-making. Many of those sites are listed in the National Register. According to the archeological overview and assessment, the entire park is considered to have high to moderate archeological sensitivity for the postcontact period (PAL 2011). Two known archeological sites are located within in the vicinity of the new trails proposed under the alternatives, including portions of the East Head Race.

In contrast, although several precontact period archeological sites have been identified within the park, the precontact archeological record is less well-known than the postcontact period. Very few archeological studies in the park were focused on identifying precontact Native American resources. Therefore, the park has the potential to contain additional precontact period resources, even in areas previously surveyed (PAL 2011). In general, the highest potential for archeological sensitivity occurs in the vicinity of streams and wetlands where Native Americans would have settled and used the water resources. Areas with low archeological sensitivity for the precontact period are generally areas with the steepest slopes (greater than 10%) in the park (PAL 2011).

### METHODOLOGY

Potential impacts on archeological resources are evaluated in terms of the amount of disturbance to an archeological resource and the degree to which the integrity remains or is otherwise lost without recordation of the remains, based on Director's Order #28: *Cultural Resource Management Guidelines*. NPS *Management Policies 2006* states that archeological resources “will be maintained and preserved in a stable condition to prevent degradation and loss... Archeological resources will be managed in situ, unless the removal of artifacts or physical disturbance is justified by research, consultation, preservation, protection, or interpretive requirements” (NPS 2006). The current conditions of archeological resources, as presented under the “Affected Environment” section above, were compared with the proposed alternatives described in chapter 2 to determine how archeological resources would be impacted. The analyses of effects on archeological resources in compliance with Section 106 is presented in the “Section 106 Assessment of Effect” section.

## **IMPACTS OF ALTERNATIVE 1: NO ACTION**

### **Direct and Indirect Impacts**

Under the no-action alternative, improvements for road crossings may have the potential to result in disturbance to intact archeological resources due to ground-disturbing activities. Specific impacts would depend upon the improvements chosen for implementation at each crossing and may be subject to additional site-specific compliance. However, ground disturbance in the vicinity of known archeological resources would be avoided and specific locations for improvements may undergo archeological survey prior to ground-disturbing activities. Any impacts on discovered resources would be avoided, minimized, or mitigated to the extent practicable.

### **Cumulative Impacts**

During scoping, the planning team considered other NPS and non-NPS projects to determine other actions that have or would have the potential to affect archeological resources within the park. The team did not identify any past, present, or reasonably foreseeable actions by the NPS or other parties that would result in cumulative impacts on archeological resources in the park. The proposed completion of the Hopewell Big Woods Trail regional trail connection through the park would follow existing trails and would only allow uses permitted by the NPS. The location of any new signage would be subject to archeological testing to avoid impacts on intact archeological resources. The regional trail connection would not result in any impacts on archeological resources and would not contribute to the cumulative effects on archeological resources in the park. Therefore, there are no cumulative impacts on archeological resources associated with the no-action alternative.

## **IMPACTS OF ALTERNATIVE 2: ENHANCED PARK EXPERIENCE (PROPOSED ACTION AND NPS PREFERRED)**

### **Direct and Indirect Impacts**

Because much of the park is considered to have a moderate to high level of archeological sensitivity, ground disturbance required for proposed wayfinding and informational signage throughout the park under alternative 2 has the potential to result in disturbance to intact archeological resources that may be present. However, ground disturbance in the vicinity of known archeological resources would be avoided. Specific locations chosen for installation would be reviewed by the Park archeologist and may be subject to archeological survey prior to ground-disturbing activities. Any impacts on discovered resources would be avoided, minimized, or mitigated to the extent practicable. Also, the disturbance to soils associated with new wayfinding and informational signage would be very minimal. Because the specific locations where signage would be installed would be informed in part by archeological survey, these improvements are unlikely to result in adverse impacts on archeological resources in the park.

Under alternative 2, the proposed new recreational hiking trail would have the potential to result in disturbance to intact archeological resources present in the area. These impacts would be due to ground disturbing activity required for construction of the trail and due to soil compaction from long-term use of the trail, both of which may alter the context of the resources by disturbing the layers of soil in which the resources sit or damaging the resource if it is compressed. Construction of

the proposed hiking trail would require up to a maximum of 1.4 acres of temporary ground disturbance lasting the period of construction, and a smaller footprint of approximately 0.5 acre that would be subject to long-term soil compaction. However, disturbance to known archeological resources in the vicinity of the proposed trail would be avoided. Any proposed ground disturbance for construction of this shared-use path would be preceded by archeological investigations to ensure that there are no significant archeological resources that could be disturbed by the activity. This would also include implementation of erosion and sediment control measures requiring ground disturbance described under the “Mitigation Measures” section in chapter 2. Should archeological resources be encountered, the NPS would take appropriate steps to avoid, minimize, or mitigate any adverse impacts on the resources, as described in the “Mitigation Measures” section in chapter 2. During implementation of the actions proposed in alternative 2, if any unanticipated discoveries are made, the NPS would consult with the PA State Historic Preservation Officer and/or associated tribes as appropriate, and as described in the “Mitigation Measures” section.

Impacts on archeological resources resulting from implementation of improvements at road crossings would be similar to those described under the no-action alternative but would include possible impacts at additional crossings at State Route 345 and Hopewell Road, as shown on figures 6 and 7. Specific impacts would depend upon the improvements chosen for implementation at each crossing and may be subject to additional site-specific compliance. However, ground disturbance in the vicinity of known archeological resources would be avoided and specific locations for improvements may undergo archeological survey prior to ground-disturbing activities. Any impacts on discovered resources would be avoided, minimized, or mitigated to the extent practicable as described under the “Mitigation Measures” section in chapter 2.

Additional archeological surveys would be needed to have a full understanding of archeological resources that are present within the areas identified for ground disturbance. Prior to implementation of the actions under alternative 2, the NPS would consult with the PA State Historic Preservation Officer, associated tribes, and other consulting parties as applicable to develop a programmatic agreement to address the potential for adverse impacts on archeological resources.

### **Cumulative Impacts**

As discussed under the no-action alternative, the planning team did not identify any past, present, or reasonably foreseeable actions by the NPS or other parties that would result in cumulative impacts on archeological resources in the park. Therefore, there are no cumulative impacts on archeological resources associated with the alternative 2.

## **IMPACTS OF ALTERNATIVE 3: PARK BIKE EXPERIENCE**

### **Direct and Indirect Impacts**

Impacts on archeological resources resulting from the installation of new wayfinding and informational signage and resulting from the allowance of bicycle use on select park trails would be the same as described under alternative 2.

Under alternative 3, the proposed new shared-use path would have the potential to result in disturbance to intact archeological resources present in the area. These impacts would be due to ground disturbing activity required for construction of the path and due to soil compaction from long-term use of the path both of which may alter the context of the resources by disturbing the

layers of soil in which the resources sit or damaging the resource if it is compressed. Construction of the proposed path would require up to a maximum of 1.8 acres of temporary ground disturbance lasting the period of construction, and a smaller footprint of approximately 0.6 acre that would be subject to long-term soil compaction. However, disturbance to known archeological resources in the area would be avoided. Any proposed ground disturbance for construction of this shared-use path would be preceded by archeological investigations to ensure that there are no significant archeological resources that could be disturbed by the activity. This would also include implementation of erosion and sediment control measures requiring ground disturbance described under the “Mitigation Measures” section in chapter 2. Should archeological resources be encountered, the NPS would take appropriate steps to avoid, minimize, or mitigate any adverse impacts on the resources, as described in the “Mitigation Measures” section above. During implementation of the actions proposed in alternative 3, if any unanticipated discoveries are made, the NPS would consult with the PA State Historic Preservation Officer and/or associated tribes as appropriate, and as described in the “Mitigation Measures” section of chapter 2.

Impacts on archeological resources resulting from implementation of improvements at road crossings would be similar to those described under the no-action alternative, but would include possible impacts at additional crossings at State Route 345 and Hopewell Road, as shown on figures 8 and 9. Mitigation measures described under the no-action alternative and under the “Mitigation Measures” section above would also apply to actions under alternative 3. Additional archeological surveys would be needed to have a full understanding of archeological resources that are present within the areas identified for ground disturbance. Prior to implementation of the actions under alternative 3, the NPS would consult with the PA State Historic Preservation Officer, associated tribes, and other consulting parties as applicable to develop a programmatic agreement to address the potential for adverse impacts on archeological resources.

## Cumulative Impacts

As discussed under the no-action alternative, the planning team did not identify any past, present, or reasonably foreseeable actions by the NPS or other parties that would result in cumulative impacts on archeological resources in the park. Therefore, there are no cumulative impacts on archeological resources associated with the alternative 3.

## CONCLUSION

Because the entire park has a moderate to high level of archeological sensitivity for precontact and/or postcontact resources, all ground-disturbing activities proposed in the alternatives have the potential to result in disturbance of intact archeological resources if any are present. However, for actions for which specific locations have not yet been determined, such as installation of signage and road crossing improvements, known archeological resources would be avoided and archeological investigations would be conducted prior to ground disturbance to ensure adverse impacts to significant resources are minimized or avoided to the extent practicable. Adverse impacts on archeological resources would be avoided entirely under the no-action alternative. There would be no threat to the integrity of existing archeological resources, and archeological resources in the park would continue to have the potential to yield information about human activity in the area during the precontact and postcontact periods under the no-action alternative.

Because additional archeological investigations would be conducted prior to ground disturbance and intact archeological resources would be avoided to the extent practicable, the integrity of the

overall archeological record within the park would not be diminished under either alternative 2 or 3. There would be no loss of significant archeological resources, and the NPS would continue to protect existing resources in situ to prevent degradation and loss. Under alternatives 2 and 3, the existing archeological resources in the park would continue to have the potential to yield information about Native Americans occupying the area in the precontact period, about furnace operation in the 18th and 19th centuries, and about the Civilian Conservation Corps activities in the 20th century.

## NATIONAL HISTORIC PRESERVATION ACT

### SECTION 106 ASSESSMENT OF EFFECT

Section 106 of the National Historic Preservation Act requires federal agencies to take into account the impacts of their undertakings on historic properties. The implementing regulations for Section 106 (36 CFR 800) permit federal agencies to use the NEPA process for environmental assessments in lieu of a separate Section 106 process to meet those requirements (36 CFR 800.8[c]). In compliance with Section 106, the NPS, through this environmental assessment, has provided the PA State Historic Preservation Officer and associated Native American Tribes with an assessment of effect.

The analyses of effects on historic properties that are presented in this section respond to the requirements of Section 106 of the National Historic Preservation Act, in accordance with the regulations implementing Section 106 (36 CFR 800, Protection of Historic Properties). The effects of the no-action alternative, alternative 2 (proposed action/NPS preferred), and alternative 3 are summarized below. The analysis of effects on historic properties was based on a review of previous studies, consideration of the proposed design concepts, and other information provided by the NPS.

#### AREA OF POTENTIAL EFFECT

For this assessment of effect, the geographic study area is generally defined as the area of potential effect, as described in the “Purpose and Need” chapter above and shown on figure 2.

#### IDENTIFICATION OF HISTORIC PROPERTIES

Historic properties within the area of potential effect include the Hopewell Furnace National Historic Site Cultural Landscape, Hopewell Furnace National Historic Site Historic District, and archeological sites. Many features within the park are considered contributing resources to the cultural landscape and/or the historic district including, but not limited to, French Creek, Baptism Creek, the Lenape Trail, the Raccoon Trail, the Buzzards Trail, the Nathan Care House, the Lloyd House, Bethesda Baptist Church, East Head Race, and Civilian Conservation Corps buildings.

Historic properties within the area of potential effect are described in detail in the “Affected Environment” section above under the impact topics of “Cultural Landscape and Historic Structures” and “Archeological Resources.” In order to fully identify archeological resources within the area of potential effect, the NPS would need to conduct additional archeological surveys once the project moves into design phases and more details such as locations and areas of disturbance are identified. The NPS would continue consultation with the PA State Historic Preservation Officer, associated tribes, and other consulting parties as appropriate to develop a programmatic agreement to address the potential for adverse effects on archeological resources.

#### ASSESSMENT OF EFFECT

##### No-Action Alternative

The no-action alternative would result in *no adverse effect* on historic properties within the area of potential effect under the criteria of adverse effects (36 CFR part 800.5). The road crossing improvements would result in the introduction of new elements into the historic setting and would somewhat detract from the historic character. However, topography throughout the park limits visibility, so these improvements would likely only be visible from short distances. For example,

improvements at any road crossings would not be visible from the historic village. No alterations would be made to the character-defining features of the cultural landscape (such as patterns of spatial organization, circulation, boundaries, vegetation, buildings and structures, and small-scale elements) in a manner that would diminish its integrity. Disturbance of archeological resources would be avoided through additional archeological investigations prior to ground-disturbing activities. The NPS would develop a programmatic agreement with the PA State Historic Preservation Officer and any associated Native American Tribes to provide a process for design review and archeological testing prior to the implementation of project elements requiring additional design. The cultural landscape and historic structures would continue to represent their associated periods of significance of the 18th and 19th century furnace and the Civilian Conservation Corps era of the 20th century. The park would remain listed in the National Register as a historic district. Overall, the historic character of the cultural landscape and the historic structures of the park would remain unaltered. There would be no alterations to the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. The NPS would reinitiate consultation with the PA State Historic Preservation Officer and associated tribes as necessary throughout the project to ensure adverse effects are avoided and/or mitigated.

## **Alternative 2: Enhanced Park Experience**

Under alternative 2, measures are in place to minimize or avoid adverse effects on the cultural landscape, historic structures, and archeological resources within the area of potential effect, as described in the "Mitigation Measures" section of the environmental assessment above. However, additional survey would be required to fully identify archeological resources within the area of potential effect, and additional design would be required to fully determine the effects on historic properties. The NPS would develop a programmatic agreement with the PA State Historic Preservation Officer and any associated Native American Tribes to provide a process for design review and archeological testing prior to the implementation of project elements requiring additional design.

Effects on the cultural landscape resulting from road crossing improvements under alternative 2 would be the same as under the no-action alternative described above. New wayfinding, informational, and interpretive signage throughout the park would also introduce new features into the historic setting. However, the signage would be designed to be compatible with the historic character of the park in terms of color, material, scale, and design. The specific locations and design of individual signs would be informed by the overall importance and sensitivity of the area. All new signage would be fully reversible. The proposed hiking trail under alternative 2 would introduce a new circulation route into the historic setting and landscape. However, the effects of the change in appearance would be mitigated by running the path alongside an existing road for much of its length. The East Head Race serves as a boundary demarcation between managed open fields; the trail segment alongside it would not interrupt the existing land patterns. The historic circulation pattern of the park as a whole would remain discernible and would maintain its integrity. Overall, the historic character of the cultural landscape and the historic structures of the park would remain unaltered. No changes would be made to the character-defining features of the cultural landscape (such as patterns of spatial organization, circulation, boundaries, vegetation, buildings and structures, and small-scale elements) in a manner that would diminish its integrity. The cultural landscape and historic structures would continue to represent their associated periods of significance of the 18th and 19th century furnace and of the Civilian Conservation Corps era of the 20th century.

All ground-disturbing activities under alternative 2 have the potential to result in disturbance to intact archeological resources within the area of potential effect. However, any ground disturbance required

for installation of new signage and for construction of the new hiking trail (including implementation of erosion and sediment control measures) would be preceded by archeological investigations to ensure that there are no significant resources that could be disturbed by the activity. Should archeological resources be encountered, the NPS would take appropriate steps to avoid, minimize, or mitigate any adverse impacts on the resources, as described in the “Mitigation Measures” section above. The NPS would develop a programmatic agreement with the PA State Historic Preservation Officer and any associated Native American Tribes to provide a process for design review and archeological testing prior to the implementation of project elements requiring additional design. For installation of signage (where the specific locations have yet to be determined) areas with known archeological resources would be avoided. Therefore, the integrity of the overall archeological record within the park would not be diminished under alternative 2. There would be no loss of significant archeological resources, and the NPS would continue to protect existing resources in situ to prevent degradation and loss. Under alternative 2, the existing archeological resources in the park would continue to have the potential to yield information about Native Americans occupying the area in the precontact period, about furnace operation in the 18th and 19th centuries, and about the Civilian Conservation Corps activities in the 20th century.

Under alternative 2, the park as a whole would remain listed in the National Register as a historic district, including its contributing historic structures and other features. There would be no alterations to the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association. The NPS would continue consultation with the PA State Historic Preservation Officer, associated tribes, and other consulting parties as appropriate throughout the project to develop a programmatic agreement to address the potential for adverse effects on archeological resources.

### **Alternative 3: Park Bike Experience**

Under alternative 3, measures are in place to minimize or avoid adverse effects on the cultural landscape, historic structures, and archeological resources within the area of potential effect. However, additional survey would be required to fully identify archeological resources within the area of potential effect, and additional design would be required to fully determine the effects on historic properties. The NPS would develop a programmatic agreement with the PA State Historic Preservation Officer and any associated Native American Tribes to provide a process for design review and archeological testing prior to the implementation of project elements requiring additional design.

Effects on the cultural landscape resulting from road crossing improvements and new wayfinding, informational, and interpretive signage under alternative 3 would be the same as under the alternative 2 described above. The proposed shared-use path would introduce a new trail into the historic setting and landscape, which would alter the appearance. However, the effects of the change in appearance would be mitigated by running the path alongside an existing road and trails and not changing the existing circulation patterns in the park. Widening of the existing trails and introducing a new surface treatment in the Baptism Creek area of the park would result in changes to the historic appearance of the area. The wider bridges over stream crossings would result in a change in historic massing of the original CCC era bridges but the stone abutments, which comprise the remaining historic fabric of the original bridges, would remain in place. Under alternative 3, the historic character of the overall cultural landscape and the historic structures of the park would remain. No changes would be made to the character-defining features of the cultural landscape (such as patterns of spatial organization, circulation, boundaries, vegetation, buildings and structures, and small-scale elements) in a manner that would diminish its integrity. The cultural landscape and

historic structures would continue to represent their associated periods of significance of the 18th and 19th century furnace and the Civilian Conservation Corps era of the 20th century.

All ground-disturbing activities under alternative 3 have the potential to result in disturbance to intact archeological resources within the area of potential effect. However, any ground disturbance required for installation of new signage and for construction of the new shared-use path (including implementation of erosion and sediment control measures) would be preceded by archeological investigations to ensure that there are no significant resources that could be disturbed by the activity. Should archeological resources be encountered, the NPS would take appropriate steps to avoid, minimize, or mitigate any adverse impacts on the resources, as described in the “Mitigation Measures” section above. The NPS would also develop a programmatic agreement with the PA State Historic Preservation Officer and any associated Native American Tribes to provide a process for design review and archeological testing prior to the implementation of project elements requiring additional design. For installation of signage (where the specific locations have yet to be determined) areas with known archeological resources would be avoided. Therefore, the integrity of the overall archeological record within the park would not be diminished under alternative 3. There would be no loss of significant archeological resources, and the NPS would continue to protect existing resources in situ to prevent degradation and loss. Under alternative 3, the existing archeological resources in the park would continue have the potential to yield information about Native Americans occupying the area in the precontact period, about furnace operation in the 18th and 19th centuries, and about the Civilian Conservation Corps activities in the 20th century.

Under alternative 3, the park would remain listed in the National Register as a historic district with its contributing historic structures. There would be no alterations to the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association. The NPS would continue consultation with the PA State Historic Preservation Officer, associated tribes, and other consulting parties as appropriate throughout the project to develop a programmatic agreement to address the unknown effects on archeological resources.

# CHAPTER 4

## CONSULTATION AND COORDINATION

### AGENCY CONSULTATION

During the public scoping period and throughout the NEPA process, the NPS consulted with the following agencies and tribes:

- § US Fish and Wildlife Service
- § Pennsylvania Game Commission
- § Pennsylvania State Historic Preservation Officer
- § Delaware Nation
- § Delaware Tribe of Indians
- § Stockbridge-Munsee Community Band of Mohican Indians

### PUBLIC REVIEW

The environmental assessment/assessment of effect will be on formal public and agency review for 30 days and has been distributed to a variety of interested individuals, agencies, and organizations. It also is available on the internet at <https://parkplanning.nps.gov/HOFU> and hard copies are available at the park's headquarters.

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**Schuylkill Highlands Partnership**

2013      Schuylkill Highlands Big Woods Trail Concept Plan Final Report.

**US Army Corps of Engineers (USACE)**

2011      Hopewell Furnace National Historic Site Hydrologic and Hydraulic Models, Chester  
and Berks Counties, PA.

**US Department of Transportation (US DOT), John A. Volpe National Transportation Systems  
Center**

2009      Hopewell Furnace NHS Alternative Transportation Study. Cambridge, MA.

# **APPENDIX A SAMPLE PHOTOGRAPHS**

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## SAMPLE PHOTOGRAPHS

The following photographs are samples of elements that could be incorporated at the sites as part of the trail system improvements. These photographs were taken at other parks.



Trail Sign



Interpretive Sign



Wayside Sign



Mile Marker



Park Sign



Trailhead Kiosk

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# **APPENDIX B**

## **DESIGN GUIDELINES**

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## DESIGN GUIDELINES

For the most part, the Hopewell Furnace National Historic Site (the park) trail plan and environmental assessment/assessment of effect (the plan) includes proposals to connect and unify existing trail facilities, recommending relatively few new facilities. These guidelines are intended to apply when improvements are made to existing infrastructure, or when new infrastructure is proposed. Implementation of the improvements recommended herein will require detailed and project-specific planning, design, and application of design guidelines. This plan therefore references applicable resources that should be consulted during the engineering design for individual improvement projects.

Given the variety of existing conditions within the overall trail network, along with the variety of types of proposed improvements (hiking trails, shared-use paths, etc.), it is impossible to establish a single set of design guidelines for the alternatives. In fact, even within individual categories (shared-use paths, for example), proposed conditions may vary on a project-by-project basis as implementation occurs over time. This section outlines the general types of criteria that may apply, while noting that specific projects or improvements may not be able to fully meet these guidelines. The resources listed below provide for variances under specific circumstances and with specific mitigating treatments.

Application of the criteria as part of a detailed design process for individual projects may result in improved accessibility meeting the Architectural Barriers Act Accessibility Standard (ABAAS) through a network of pedestrian paths, recreational hiking trails, and shared-use paths, as defined herein and in the referenced resources. These facilities could provide access to restrooms, visitor centers, trailheads, and primary interpretive destinations to help enhance the visitor experience of the sites. Based on existing conditions and resource sensitivity, many of the existing off-road trails throughout the sites would not fully meet ABAAS requirements, and would provide a more recreational experience.

The following references provide nationally accepted standards for the facilities recommended in the trail plan:

- § American Association of State Highway and Transportation Officials (AASHTO) *Guide for the Planning, Design and Operation of Pedestrian Facilities*
- § AASHTO *Guide for the Development of Bicycle Facilities*
- § *The Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities* (ADAAG)
- § Pennsylvania State Department of Transportation (PennDOT) Highway Design Manual, especially Chapter 2, “Design Elements and Design Controls”, Chapter 6, “Pedestrian Facilities and the Americans with Disabilities Act”, and Chapter 16, “Bicycle Facilities”.
- § *Manual on Uniform Traffic Control Devices 2009 Edition*.

## SIDEWALKS, PEDESTRIAN PATHS, AND RECREATIONAL HIKING TRAILS

A sidewalk is a pedestrian-only path adjacent to a roadway. A pedestrian path is a facility that meets sidewalk criteria but is not adjacent to roadway. A recreational hiking trail is a pedestrian-only facility, but includes a lesser degree of ABAAS accommodation than a sidewalk or pedestrian path.

Much of the existing off-road trail network at HOFU consists of pedestrian-only trails that in some cases meet ABAAS requirements for recreational hiking trails, but in many cases do not.

Construction of new facilities and improvements to existing facilities should strive to provide ABAAS accessibility, but the referenced sources allow flexibility to address existing conditions and other constraints.

## **Users and Code of Conduct**

Sidewalks, pedestrian paths, and recreational hiking trails are intended for pedestrian use only; bicycles and motor vehicles are prohibited from using these facilities.

## **Criteria to Consider**

**Note:** Sidewalks generally have a higher level of design criteria than recreational hiking trails.

**Width:** Walkway width refers to that section of the walkway that is free of obstructions or impediments and is actually accessible to pedestrian travel. In general, sidewalks and pedestrian paths should maintain a minimum width of 1.525m, exclusive of the curb.

**Running Slope:** The running slope of pedestrian facilities should not exceed 5%.

**Cross Slope:** Acceptable cross slopes on pedestrian facilities are governed by the need to maintain a relatively flat travel surface while also providing adequate drainage. In general, a 2% cross slope will address both these goals.

**Walking Surface:** Surfaces should be stable, firm, and slip resistant, providing a hard-surfaced, smooth, durable, and all-weather facility.

**Placement within the Right-of-Way:** In general, sidewalks should be separated from vehicular travel lanes by a minimum distance of 2.5m from back of curb. The referenced sources provide guidance on varying from this standard where this minimum distance is not feasible.

**Pedestrian Facility Design Elements:** These include related improvements such as lighting, benches, and signs. Their placement relative to the function and comfort of the facility needs to be considered along with the need to avoid obstruction of the pedestrian facility. The referenced sources provide specific guidance. It should be noted here that national standards exist regarding the lighting of pedestrian facilities; these should also be considered during the design process.

**Pedestrian Crossings:** The referenced sources provide guidance on design of pedestrian crossings for various street types, vehicular speeds, and intersection types.

## **SHARED-USE PATHS**

Shared-use paths are off-road facilities that can accommodate both pedestrians and bicyclists. Design of shared-use paths should incorporate ABAAS requirements for sidewalks and recreational hiking trails, in addition to considering the criteria discussed below.

## **Users and Code of Conduct**

Currently, the off-road trail facilities in the park are almost exclusively limited to pedestrian use. The alternatives recommend opening certain sections of existing trails to recreational bicycle use. Much of the network would remain pedestrian only. Signage and wayfinding will be important to delineate

permitted trail uses. In shared-use conditions, bicyclists should yield to pedestrians and remain cognizant that they are operating in a shared-use environment.

## Criteria to Consider

**Design Speed:** The speed that a bicyclist travels depends on several factors, including the type and condition of the bicycle, the purpose of the trip, the condition and location of the bicycle path, the speed and direction of the wind, and the bicyclist's physical condition (AASHTO Guide, page 36). It is anticipated that the proposed shared-use paths would be used by a wide range of bicyclists, including experienced bicyclists who utilize on-road facilities and travel at higher speeds.

Specific design speeds should be chosen on individual projects as part of the engineering design and consultation process. Existing and proposed shared-use paths should be designed for speeds at least as high as the preferred speed of the faster bicyclists, but paths should not be designed to encourage speed. It is also recommended that trail design at intersecting roadways be configured to encourage a lower speed for bicyclists. Traffic control devices, such as warning signs and pavement markings, should be installed on the roadways approaching intersections to alert motorists to the presence of bicyclists, and to encourage lower speeds for motorists approaching the intersections.

**Width:** In addition to bicyclists, anticipated trail users include pedestrians such as walkers and joggers. It is also anticipated that maintenance vehicles will require access to the proposed trail. AASHTO recommends a minimum width of 10 feet for a proposed two-direction trail. The guidelines also recommend a maximum cross slope of 2% to satisfy requirements of the Architectural Barriers Act Accessibility Standard.

**Horizontal Alignment and Clearance:** Horizontal curves are important for sight distance and navigating safely at design speeds. Clearances along curves (including vegetation and other obstructions) are also important for maintaining sight distances. The horizontal alignment of a shared-use path is described as a series of tangents connected to each other by circular curves. The minimum radius of curvature negotiable by a bicycle is a function of the superelevation ( $e$ ), coefficient of friction, type of bicycle surface, and speed. Because the proposed trails would generally follow existing alignments, standard criteria may be difficult to achieve. Horizontal clearance addresses graded shoulder areas as well as clearance from walls, fences, and other lateral obstructions. Again, given existing conditions, standard minimum horizontal clearance may be difficult to achieve. Finally, the referenced sources address the need for bicycle railings at bridge approaches, bridges, and steep side slopes.

**Vertical Alignment and Clearance:** Vertical alignment addresses the running slope and vertical curves along the trail's length. Vertical alignment criteria are important for maintaining ABAAS accessibility, and also for visibility over hills. Because the vast majority of the trail network will rely on existing trails and roads, the vertical alignment is already set, and will not always meet standard minimum criteria. For new trail segments, vertical alignment should be considered as part of the design process, consulting guidance in the referenced sources. Vertical clearance addresses overhanging obstacles within this trail alignment.

**Sight Distances:** Design of potential trail alteration or construction should consider three types of sight distances—stopping sight distance, intersection sight distance, and decision sight distance.

*Stopping Sight Distance:* The stopping sight distance (SSD) is the distance required to bring a vehicle (motorized or bicycle) to a full, controlled stop. The SSD is influenced by a variety of factors, including surface conditions and trail grade.

Intersection Sight Distance: The amount of sight distance necessary for trail users to cross the intersection from a full stop depends on several factors, including the time needed to cross the roadway, the distance the approaching motor vehicle will travel in that time, and vehicle speeds.

Decision Sight Distances: For motorists, decision sight distance (DSD) is the distance required for a driver to detect and recognize a roadway hazard, adjust the vehicle's path and speed accordingly, and stop safely.

DSD differs in concept for bicyclists. For bicycles, proper DSD provides clear sight lines based on the distances approaching motor vehicles will travel in the time a bicyclist takes to fully clear the trail/roadway intersection from a "stop-go" decision point. The decision point is the point the bicyclist makes the decision to stop or proceed without stopping irrespective of the presence of a stop sign or signal. The bicycle DSD acknowledges bicyclists' desire to maintain momentum.

**Trail Surface Material:** Existing trail surface materials vary considerably throughout the park. Trail alterations or construction should consider the need for stabilized earth, ground limestone, or other similar firm all-weather surface.

**Drainage:** A minimum cross slope of 2% is generally recommended to enable adequate drainage. Existing conditions may limit the ability to achieve this standard within the trail network.

**Controlling Vehicular Access:** Vehicle access control should be installed at roadway crossings and trailheads to restrict unauthorized motor vehicle access to the proposed trail.

## ON ROAD ACCOMMODATIONS

The existing trail network within the park includes use of park access roads by bicycles, pedestrians, and vehicles. The alternatives recommend signage and wayfinding enhancements to improve these low-volume, low-speed roadways.

# **APPENDIX C**

## **LIST OF CLASSIFIED**

## **STRUCTURES**

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## Description: Park = HOFU

	Preferred Structure Name	Structure Number ▲	Park	LCS ID
1.	Ironmaster's House	001	Hopewell Furnace National Historic Site	000695
2.	Ironmaster's Front Yard Wall	001A	Hopewell Furnace National Historic Site	081433
3.	Ironmaster's Garden Fence	001B	Hopewell Furnace National Historic Site	081434
4.	Ironmaster's Kitchen Yard Walls	001C	Hopewell Furnace National Historic Site	081461
5.	Barn [Furnace]	002	Hopewell Furnace National Historic Site	006823
6.	Office and Store	003	Hopewell Furnace National Historic Site	000698
7.	Cedar Pasture Fence	004	Hopewell Furnace National Historic Site	081451
8.	Blacksmith Shop	006	Hopewell Furnace National Historic Site	000683
9.	Furnace	007	Hopewell Furnace National Historic Site	000691
10.	Furnace Bank and Retaining Wall	008	Hopewell Furnace National Historic Site	012113
11.	Charcoal House and Cooling Shed	009	Hopewell Furnace National Historic Site	000688
12.	Bridge House	010	Hopewell Furnace National Historic Site	416851
13.	Connecting Shed	010A	Hopewell Furnace National Historic Site	416870
14.	Anthracite Furnace Ruin	011	Hopewell Furnace National Historic Site	000680
15.	Greenhouse Ruin [Ironmaster's]	013	Hopewell Furnace National Historic Site	006821
16.	Bake Ovens [Ironmaster's]	016	Hopewell Furnace National Historic Site	000681
17.	Spring House [Ironmaster's]	017	Hopewell Furnace National Historic Site	000700
18.	School House Ruin	018	Hopewell Furnace National Historic Site	000699
19.	Tenant House No. 1	019	Hopewell Furnace National Historic Site	000703
20.	Tenant House No. 1 Walkway	019A	Hopewell Furnace National Historic Site	081453
21.	Tenant House No. 2	020	Hopewell Furnace National Historic Site	000704
22.	Tenant House No. 3	021	Hopewell Furnace National Historic Site	000705
23.	Tenant House No. 3 Fence	021A	Hopewell Furnace National Historic Site	081452
24.	Tenant House No. 3 Stable	023	Hopewell Furnace National Historic Site	022829
25.	Boarding House	024	Hopewell Furnace National Historic Site	000684

26. Boarding House Pump and Well Cover	024A	Hopewell Furnace National Historic Site	081445
27. Nathan Care House	025	Hopewell Furnace National Historic Site	000686
28. Nathan Care Field Stone Wall	025A	Hopewell Furnace National Historic Site	081448
29. Nathan Care Boundary Stone Wall	025B	Hopewell Furnace National Historic Site	081449
30. Nathan Care Barn	026	Hopewell Furnace National Historic Site	006828
31. John Church House	027	Hopewell Furnace National Historic Site	006826
32. John Church CCC Retaining Walls and Steps	027A	Hopewell Furnace National Historic Site	081460
33. John Church Barn	028	Hopewell Furnace National Historic Site	006827
34. Spout Run CCC Culvert	029	Hopewell Furnace National Historic Site	081462
35. East Head Race	032	Hopewell Furnace National Historic Site	000692
36. East Head Race Retaining Wall	032A	Hopewell Furnace National Historic Site	081463
37. Cast House/Cleaning Shed/Carpenter's Shop	033	Hopewell Furnace National Historic Site	416880
38. Ore Roaster Ruin	034	Hopewell Furnace National Historic Site	006825
39. Wheelwrights Shop Ruin	035	Hopewell Furnace National Historic Site	000707
40. Charcoal Kiln Ruin	039	Hopewell Furnace National Historic Site	000690
41. Smoke House [Ironmaster's]	041	Hopewell Furnace National Historic Site	006822
42. Harrison Lloyd House Ruin	044	Hopewell Furnace National Historic Site	416844
43. Brison House Ruin	055	Hopewell Furnace National Historic Site	081456
44. Brison Field Wall & Foundation Ruins	055A	Hopewell Furnace National Historic Site	233800
45. Lloyd House	071	Hopewell Furnace National Historic Site	000697
46. Loyd House Wagon Shed	071A	Hopewell Furnace National Historic Site	017267
47. Lloyd Farm Lane	071B	Hopewell Furnace National Historic Site	081459
48. Lloyd Stone Walls	071C	Hopewell Furnace National Historic Site	081455
49. Harrison Lloyd Blacksmith Shop Ruin	072	Hopewell Furnace National Historic Site	081443
50. Harrison Lloyd Stone Walls	073	Hopewell Furnace National Historic Site	081440

## Description: Park = HOFU

Preferred Structure Name	Structure Number▲	Park	LCS ID
51. Harrison Lloyd Barn Ruin	074	Hopewell Furnace National Historic Site	233842
52. Harrison Lloyd Farm Bank Barn Ruin	074A	Hopewell Furnace National Historic Site	264599
53. Harrison Lloyd Worm Fence Ruins	074B	Hopewell Furnace National Historic Site	264615
54. Harrison Lloyd Road	074C	Hopewell Furnace National Historic Site	234902
55. Woodlot House Ruin	076	Hopewell Furnace National Historic Site	081437
56. Bethesda Church	079	Hopewell Furnace National Historic Site	006829
57. Bethesda Church Cemetery Wall	079A	Hopewell Furnace National Historic Site	006830
58. Bethesda Church Cemetery	079B	Hopewell Furnace National Historic Site	081613
59. Bethesda Church Carriage Shed	080	Hopewell Furnace National Historic Site	006831
60. Bethesda Church Privy	081	Hopewell Furnace National Historic Site	006832
61. Wheel House, Water Wheel, and Blast Machinery	082	Hopewell Furnace National Historic Site	416885
62. Mule Stable Ruin [Village Barnyard]	083	Hopewell Furnace National Historic Site	081450
63. Lloyd Spring House	087	Hopewell Furnace National Historic Site	081444
64. Woodlot CCC Spring House	088A	Hopewell Furnace National Historic Site	081436
65. Lenape CCC Spring House	088B	Hopewell Furnace National Historic Site	233758
66. Nathan Care CCC Spring House	088C	Hopewell Furnace National Historic Site	851747
67. Tail Race	110	Hopewell Furnace National Historic Site	000702
68. West Head Race	111	Hopewell Furnace National Historic Site	000693
69. Private Road to Dam	112	Hopewell Furnace National Historic Site	081457
70. Private Charcoal House Turn-Around	113	Hopewell Furnace National Historic Site	081458
71. 1772 Road (Jones Mine Road)	114	Hopewell Furnace National Historic Site	081442
72. 1815 Road (Warwick Mine Road)	115	Hopewell Furnace National Historic Site	006835
73. 1815 Road (Warwick Mine Road) Bridge	115A	Hopewell Furnace National Historic Site	081447
74. French Creek Bridge	115B	Hopewell Furnace National Historic Site	081446
75. 1757 Road (Reading to Valley Forge Road)	116	Hopewell Furnace National Historic Site	006836
76. <u>1804 Road (Birdsboro Road)</u>	117	Hopewell Furnace National Historic Site	006837
77. 1825 Road	118	Hopewell Furnace National Historic Site	006838

78. 1809 Road (Joanna Road)	119	Hopewell Furnace National Historic Site	006839
79. Hearth Road Trace	121	Hopewell Furnace National Historic Site	081454
80. Baptism Creek Picnic Shelter & Concession Building	122	Hopewell Furnace National Historic Site	081435
81. Charcoal Hearths	123	Hopewell Furnace National Historic Site	261966
82. Baptism Creek CCC Fireplaces	124	Hopewell Furnace National Historic Site	799173
83. Baptism Creek CCC Parking Area	125	Hopewell Furnace National Historic Site	799185
84. Baptism Creek CCC Water Fountain	126	Hopewell Furnace National Historic Site	799198
85. Baptism Creek CCC Foot Bridges	127	Hopewell Furnace National Historic Site	799209
86. CCC Hiking Trails	128	Hopewell Furnace National Historic Site	799219



As the nation's principal conservation agency, the Department of the Interior has responsibilities for most of our nationally owned public lands and natural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historic places, and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people. The department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for American Indian reservation communities and for people who live in island territories under US administration.