4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

NEPA requires that a range of reasonable alternatives and the unavoidable environmental consequences associated with implementation of the alternatives be revealed prior to undertaking proposed federal actions. This chapter provides a summary of the analysis of the environmental consequences associated with implementation of the No Action Alternative and a full range of action alternatives. The No Action Alternative is consistent with the management direction provided in the 1982 General Management Plan and builds upon and incorporates the findings of NEPA documents associated with the 1982 Plan. Actions required to implement each of the proposed alternatives are described in Chapter 2: "Alternatives, Including the Environmentally Preferred Alternative". The NPS may amend the management direction provided in the 1982 Plan with the new direction provided by the agency preferred alternative selected during this process.

The goals of NPS management for all resources are achieved through consideration of the potential resource impacts associated with each alternative and identification of an alternative that balances unavoidable impacts with the goals and objectives for the project. Resource impacts associated with each alternative differ greatly in their context, intensity and duration and this balanced approach considers the merit of all resources equally.

Impact topics were defined during the scoping phase of the project and the alternatives were analyzed with respect to them. The topics include cultural resources, natural resources, interpretation and visitor use, socioeconomic environment, land use, access and circulation, air quality, aesthetics and viewsheds, noise, and NPS operations. The existing condition for all of these topics is described in detail in Chapter 3: "Affected Environment", which contains data collected to fully describe all potentially affected resources within the Elkmont Historic District. Using the information collected and documented on the existing condition of the District, potential environmental consequences of each alternative are explained in this chapter in terms of their context, duration, and intensity.

Types of Effects

For some resources, no effect would occur as a result of implementing an alternative. Other effects can be either beneficial or adverse. Effects are evaluated per NEPA guidance as to whether they are direct, indirect or cumulative. NEPA (40 CFR Part 1508) defines each type of effect according to the following definitions:

Direct effect - impacts that are caused by implementation of the proposed alternative at the same time and in the same place as the action

Indirect effect – impacts that are caused by implementation of the proposed alternative, but occur later in time or farther in distance from the proposed action

Cumulative effect – the incremental environmental impact of the action, together with impacts of past, present and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. The area of concern is the Park and, in some cases, this area extends to the surrounding region as well.

Duration of Effects
For the purposes of this study, effects are described in terms of their duration as follows:

Short- term effects – impacts that occur during and immediately following project implementation.

Long- term effects- impacts that result from project implementation and directly alter a resource to the extent that the impact is evident following implementation, either for a prolonged period of time or permanently.

Intensity of Effects
Effects are also described in terms of the intensity of the impact on each resource. Intensity of effects ranges from negligible to major for each resource, with negligible representative of little or no effect and major creating an entirely adverse or beneficial impact to the resource. The thresholds for each category are provided in Table 4- 1 for each impact topic.

Section 106 Findings
In addition to describing effects under the NEPA process as discussed above, potential impacts to Cultural Resources must also be identified in terms of their compliance with Section 106 of the National Historic Preservation Act. As described in 36 CFR, the Section 106 process seeks to accommodate historic preservation concerns with the needs of federal undertakings through consultation between the agency official and other parties with an interest in the effects of the undertaking on historic properties. The goal of consultation is to identify historic properties potentially affected by the undertaking, assess its effects and seek ways to avoid, minimize and mitigate any adverse effects on historic properties. Section 106 effects determinations specified in 36 CFR Part 800 Protection of Historic Properties consist of findings of adverse effect and findings of no adverse effect.

The criteria for effects determinations under Section 106 of the National Historic Preservation Act are described in 36 CFR § 800.5 as follows:

> An undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register.
>
> The agency official, in consultation with the SHPO/THPO, may propose a finding of no adverse effect when the undertaking's effects do not meet the

criteria of adverse effect or the undertaking is modified or conditions are imposed, such as the subsequent review of plans for rehabilitation by the SHPO/THPO to ensure consistency with the Secretary's Standards for the Treatment of Historic Properties (36 CFR part 68) and applicable guidelines, to avoid adverse effects.

As a result, in order to identify potential effects to cultural resources under Section 106 of the National Historic Preservation Act, as well as NEPA, impact thresholds have been specified for determination of potential effects under both laws (Table 4- 1).

At the end of the effects analysis for each alternative, a summary of all potential effects of implementing the alternative is provided. This information is also included in a series of tables at the end of this chapter to facilitate comparisons between project alternatives.

Table 4- 1: Impact Threshold Definitions

CULTURAL RESOURCES		
Buildings	Negligible	Effect(s) at the lowest level of detection—barely measurable, with no perceptible consequences, either adverse or beneficial. The Section 106 determination of effect would be *no adverse effect*.
	Minor	Adverse effect – impact(s) would alter a feature(s) of the building(s) but would not diminish the overall integrity of the resource(s). The Section 106 determination of effect would be *no adverse effect*. Beneficial effect – stabilization/preservation of features in accordance with *The Secretary's Treatment Standards*. The Section 106 determination of effect would be *no adverse effect*.
	Moderate	Adverse effect – impact(s) would alter a feature(s) of the building(s), diminishing but not destroying the overall integrity of the resource(s). The Section 106 determination of effect would be *adverse effect*. Beneficial impact – rehabilitation of a building(s) in accordance with *The Secretary's Treatment Standards*. The Section 106 determination of effect would be *no adverse effect*.
	Major	Adverse effect – impact(s) would substantially alter the building(s), greatly diminishing or even destroying the overall integrity of the resource(s). The Section 106 determination of effect would be *adverse effect*. Beneficial effect – restoration of a building(s) in accordance with *The Secretary's Treatment Standards*. The Section 106 determination of effect would be *no adverse effect*.
Cultural Landscape	Negligible	Effect(s) at the lowest level of detection—barely measurable, with no perceptible consequences, either adverse or beneficial. The Section 106 determination of effect would be *no adverse effect*.
	Minor	Adverse effect – impact(s) would alter a pattern(s) or feature(s) of the cultural landscape, but would not diminish the overall integrity of the landscape. The Section 106 determination of effect would be *no adverse effect*. Beneficial effect – preservation of cultural landscape patterns and features in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*. The Section 106 determination of effect would be *no adverse effect*.
	Moderate	Adverse effect – impact(s) would alter a pattern(s) or feature(s) of the cultural landscape, diminishing but not destroying the overall integrity of the landscape. The Section 106 determination of effect would be *adverse effect*. Beneficial effect – rehabilitation of a landscape or its patterns and features in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes* . The Section 106 determination of effect would be *no adverse effect*.
	Major	Adverse effect – impact(s) would substantially alter a pattern(s) or feature(s) of the cultural landscape, greatly diminishing or even destroying the overall integrity of the landscape. The Section 106 determination of effect would be *adverse effect*. Beneficial effect – restoration of a landscape or its patterns and features in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes* . The Section 106 determination of effect would be *no adverse effect*.

Table 4- 1: Impact Threshold Definitions (continued)

CULTURAL RESOURCES (continued)		
Archeology	Negligible	Effect to the site(s) is at the lowest level of detection – barely measurable with no perceptible consequences, either adverse or beneficial. The Section 106 determination of effect would be *no adverse effect.*
	Minor	Adverse effect – disturbance of the site(s) results in little, if any, loss of integrity or information potential. The Section 106 determination of effect would be *no adverse effect.* Beneficial effect – Preservation of the site(s) in its natural state. The Section 106 determination of effect would be *no adverse effect.*
	Moderate	Adverse effect – disturbance of the site(s) would not result in substantial loss of integrity or information potential. The Section 106 determination of effect would be *adverse effect.* Beneficial effect – Stabilization of a site(s). The Section 106 determination of effect would be *no adverse effect.*
	Major	Adverse effect – disturbance of the site(s) would result in substantial loss of integrity or information potential. The Section 106 determination of effect would be *adverse effect.* Beneficial effect – Active intervention to preserve the site(s). The Section 106 determination of effect would be *no adverse effect.*
SOILS		
	Negligible	Effects cause no measurable or perceptible changes in soil structure.
	Minor	Effects are measurable or perceptible, but occur over a small area or areas in which soil disturbance has occurred in the past.
	Moderate	Effects are localized and small in size, but cause a permanent change in the soil structure.
	Major	Effects to the soil structure are substantial, highly apparent, and permanent.
BIOTIC COMMUNTIES		
Terrestrial Plant Communities	Negligible	Effects cause no measurable or perceptible changes in plant community size, integrity or continuity in the short-term, and are not predicted to occur in the long- term.
	Minor	Effects on plant communities are measurable or perceptible, create a short- term disruption, but effects are within the natural variability and are localized within a limited spatial scale. The overall viability of the plant community would not be affected and, if left alone, would recover.
	Moderate	The severity and duration of effects to plant communities are expected to be outside the natural variability for short periods of time, but may cause a long- term change within the natural variability of plant community diversity or relative cover of native species. Alterations to a G1 – G3 ranked community would occur on a limited spatial scale and are within natural variability.
	Major	The severity and duration of impacts to plant communities are expected to be outside the natural variability for short to long periods of time or permanent. Impacts may cause a long- term or permanent change in the natural variability of plant community diversity or relative cover of native species. Included are alterations that result in degradation or loss of a G1 – G3 ranked community and those that would occur outside natural variability.

Table 4- 1: Impact Threshold Definitions (continued)

BIOTIC COMMUNTIES (continued)		
Aquatic Communities	Negligible	Effects cause no measurable or only slightly perceptible changes in aquatic community structure, function and composition.
	Minor	Effects (beneficial or adverse) are detectible, but slight. If adverse, the overall viability of the aquatic community would not be affected and, if left alone, would recover.
	Moderate	Effects (beneficial or adverse) are apparent and would cause long- term changes in aquatic community structure, function and composition.
	Major	Effects (beneficial or adverse) would be substantial and severe, highly visible and permanent.
Wetlands	Negligible	Effects cause no measurable or perceptible changes in wetland size, integrity, continuity or function.
	Minor	Effects are measurable or perceptible and localized within a relatively small area. The overall viability and function of the wetland would not be affected.
	Moderate	Effects would cause a long- term change in the wetland in terms of native species diversity, soil structure, hydrology or primary functions and values.
	Major	Effects on the wetlands would be substantial, highly visible within the District, and permanent; wetland would be filled or obliterated.
Floodplains	Negligible	Effects cause no measurable or perceptible changes in floodplain size, integrity, continuity or function
	Minor	Effects are measurable or perceptible and localized within a relatively small area. Floodplain storage capacity would not be affected
	Moderate	Effects would cause a long- term change in the floodplain in terms of primary functions and values
	Major	Effects on floodplains would be substantial, highly visible within the District, and permanent; floodplain storage capacity would be changed; floodplain function would be permanently altered
Threatened and Endangered Species	Negligible	No effect; The action would not affect a listed species or its designated critical habitat.
	Minor	Not likely to adversely affect; impacts on listed species are expected to be insignificant or completely beneficial. Beneficial impacts are contemporaneous positive effects without any adverse effects on the species.
	Moderate	Likely to adversely affect; impacts on listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, and the effect is discountable, insignificant or completely beneficial.
	Major	Likely to adversely affect; An adverse impact on a listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, and the effect is not discountable, insignificant or beneficial.

Table 4- 1: Impact Threshold Definitions (continued)

BIOTIC COMMUNTIES (continued)		
Rare and Sensitive Species	Negligible	No impacts; no rare or sensitive species are present.
	Minor	Effects to rare or sensitive species, adverse or beneficial, are detectable
	Moderate	May impact individuals, but is not likely to cause a trend to federal listing or loss of viability; rare or sensitive species are present and project is occurring during vulnerable life stages (e.g. flowering, hibernation, etc.).
	Major	Likely to cause a trend towards federal listing or a loss of viability; rare or sensitive species are present in high numbers and project implementation is occurring during vulnerable life stages.
Water Quality	Negligible	Effects, beneficial or adverse, (chemical, physical or biological effects) are not detectable and water quality remains well below limits of water quality standards and/or historical ambient or desired water quality conditions.
	Minor	Effects, beneficial or adverse, (chemical, physical or biological effects) are detectable, but water quality remains well within or below limits of water quality standards and/or historical ambient or desired water quality conditions.
	Moderate	Effects, beneficial or adverse, (chemical, physical or biological effects) are detectable and water quality remains within or below limits of water quality standards, but historical baseline or desired water quality conditions are being altered on a short- term basis.
	Major	Adverse effects (chemical, physical or biological effects) are detectable, and significantly and persistently alter historical baseline or desired water quality conditions; Beneficial impacts eliminate sources of contamination or sedimentation of surface waters on a permanent basis.
AIR QUALITY		
	Negligible	Net decrease in NOx and VOCs emissions compared to current levels or no measurable changes to current emissions in non- attainment areas following project implementation.
	Minor	Emissions decrease (beneficial) or increase (adverse) over the existing condition. If adverse, one or both NOx and VOCs emissions increase by 1 to 5 tons per year following project implementation in non- attainment areas.
	Moderate	Beneficial: Emissions of NOx and VOCs decrease permanently by 1 to 5 tons per year over the existing condition, aiding the state's ability to meet national ambient air quality standards. Adverse: Either NOx or VOCs emissions increase following project implementation in non- attainment areas by more than 5 tons per year from current levels.
	Major	Beneficial: Permanent decreases greater than 5 tons per year in emissions of NOx and VOCs occur. Adverse: Permanent increases greater than 5 tons per year in emissions of NOx and VOCs occur as a result of project implementation; these increases either directly, indirectly, or cumulatively interfere with the state's ability to meet national ambient air quality standards in non- attainment areas.

Table 4- 1: Impact Threshold Definitions (continued)

INTERPRETATION AND VISITOR USE		
Visitor Experience and Visitor Facilities	Negligible	No effects or only temporary effects are anticipated on the visitor experience. Little noticeable change in visitor experience (or in the defined indicators of visitor experience, such as visitation numbers) or behavior. The impact on visitor safety is not measurable or perceptible.
	Minor	Desired visitor experience is changed, but without appreciably limiting or enhancing critical characteristics of the experience. Visitor satisfaction remains stable. Impacts on visitor safety may be realized through a minor increase or decrease in the potential for visitor conflicts in potential accident areas (traffic accidents, hazard tree effects, etc.)
	Moderate	Critical characteristics of the desired experience are changed or the number of participants engaging in an activity is changed (beneficial or adverse). The potential impact on visitor safety is sufficient to either remove existing potential hazards or to create the potential for additional visitor conflicts or accidents. If adverse, visitor satisfaction declines.
	Major	Potential effects would either greatly enhance or detract from multiple critical characteristics of the desired visitor experience or greatly reduce or increase participation in visitor activities.
SOCIOECONOMIC ENVIRONMENT		
Land Use	Negligible	No effects occur or the effects on land use are at or below the level of detection.
	Minor	Effects (beneficial or adverse) to existing land use are detectable, short- or long- term. User conflicts are not anticipated.
	Moderate	Existing land uses are expanded to include other allowable uses under the transportation and general Park development subzones. If beneficial, no user conflicts would be anticipated. If adverse, user conflicts are expected to arise due to conflicting use of resources or degradation of resources due to intensity of use.
	Major	Existing land uses would be expanded to include other allowable uses under the transportation and general Park development subzones, as well as introduction of other uses not included in these subzones. If beneficial, no user conflicts would be anticipated. If adverse, user conflicts are expected to arise due to conflicting use of resources or degradation of resources due to intensity of use.
Access and Circulation	Negligible	No changes in access or internal circulation result; visitation, if altered, would not affect internal circulation.
	Minor	Changes to internal circulation are required to implement the alternative. Includes beneficial impacts (such as repair of existing roadways and parking areas).
	Moderate	Changes to internal circulation and access restrictions are required to implement the alternative. Some changes in circulation and access features are required to implement the alternative (such as construction of pull off parking for exhibits and repair of existing roadways). Associated operation and maintenance costs would increase.
	Major	Considerable changes to the internal circulation and access restrictions are required to implement the alternative. Changes include addition of parking areas across the District, incorporation of features to ensure pedestrian safety; associated operation and maintenance costs would increase.

Table 4- 1: Impact Threshold Definitions (continued)

VIEWSHED		
	Negligible	The visual quality of the landscape would not be affected or, if effects did occur, they would be at or below the level of detection, would be short- term, and the changes would be so slight that they would not be of any measurable or perceptible consequence to the visitor experience.
	Minor	Effects to the visual quality of the landscape would be detectable, although the effects would be localized and would be small and of little consequence to the visitor experience.
	Moderate	Effects to the visual quality of the landscape would be readily detectable, long- term and localized, with consequences at the District level.
	Major	Effects to the visual quality of the landscape would be obvious, long- term, and would have substantial consequences to the visitor experience in the District.
SOUNDSCAPE		
	Negligible	The natural sound environment would not be affected or the effects would be at or below the level of detection, would be short- term, and the changes would be so slight that they would not be of any measurable or perceptible consequence to the visitor experience or to biological resources.
	Minor	Effects to the natural sound environment would be detectable, although the effects would be short- term, localized and would be small and of little consequence to the visitor experience or to biological resources.
	Moderate	Effects to the natural sound environment would be readily detectable, long- term and localized, with consequences at the local (District) level.
	Major	Effects to the natural sound environment would be obvious, long- term, and would have substantial consequences to the visitor experience or to biological resources in the region.
NPS OPERATIONS		
	Negligible	Park operations would not be affected or the effect would be at or below the level of detection.
	Minor	The effects on NPS operations would be detectable and likely short- term, but would be of a magnitude that would not have an appreciable effect on existing operations.
	Moderate	The effects on NPS operations would be apparent, long- term, and would result in a substantial change in Park operations in a manner noticeable to staff and to the public.
	Major	The effects on NPS operations would be readily apparent, long- term, and would result in a substantial change in Park operations in a manner noticeable to the staff and the public. The effects would create a condition considerably different than the existing condition and would require additional Park staff, funding or other resources.

4.2 Impacts of No Action Alternative

The No Action Alternative entails the removal of all historic buildings in the Elkmont Historic District, either by mechanical means or by hand. This action would be taken in accordance with the management direction provided in the 1982 General Management Plan. Foundations, chimneys, stone walls, and other cultural landscape features would remain in place wherever they would not pose a safety hazard to visitors. In addition to allowing vegetation to return to a natural state where buildings are removed, the Park would continue to implement its current natural resource management activities. The amount of visitation under the No Action Alternative is not expected to change as a result of project implementation. There would be no changes to existing access, circulation or to the current level of general maintenance of existing infrastructure.

4.2.1 Impacts on Cultural Resources

Buildings and Cultural Landscape

The No Action Alternative proposes removal of all historic buildings. These buildings provide a dominant definition to the cultural landscape and removal of these elements would significantly alter the cultural landscape (mainly the "spatial organization", and "buildings and structures" characteristics; see Table 3- 3). Other cultural landscape features, such as historic plantings, stone walls, and chimneys, would remain. This action would cause direct, major, adverse effects on the National Register of Historic Places-listed District and its cultural landscape, as would the change in use and setting (36 CFR 800.5[a][1] and [2]). These effects would be permanent. The use and setting of the District would change from that of a built, historic area to a forested area. There would be no indirect effects on the buildings or cultural landscape in the District.

Archeological Resources

The potential for the No Action Alternative to impact archeological resources depends on the level, extent and location of ground- disturbing activities. Since this alternative proposes removal of all the historic buildings in the District, there is potential to impact archeological resources at several locations. The ultimate impacts to archeological resources due to project implementation would depend on the outcome of additional investigations. NPS staff would continue established resource protection measures for the identification and treatment of archeological resources on a case- by- case basis. The proper execution of avoidance or protective strategies could ensure that no effect on archeological resources would occur.

The areas where such resources could potentially be adversely affected include one locus where a significant resource has been documented, four loci where potentially significant resources have been identified, and two areas that have not yet been surveyed. There would be no effect on potentially significant resources at 12 loci. Since eligibility for listing on the National Register of Historic Places has not been determined for most of the resources, and since no beneficial effects would be recognized, the project effects are uniformly categorized as potential adverse effects. If impacts occurred, they would be direct, adverse, permanent, and could be major. Table 4- 2 at the end of this chapter provides a summary of the known or potential effects to each archeological resource for the No Action Alternative and the other project alternatives.

Estimates of the potential costs associated with additional archeological survey, evaluation, and site monitoring for this and other alternatives have been developed and are presented in Table C- 5 of Appendix C. In addition, measures have been recommended to minimize the potential for adverse effects to archeological resources during project implementation. Detailed recommendations for avoiding potential archeological impacts in the area of each historical building or group of buildings are provided as part of site- specific recommendations summarized in Appendix E, Table E-1. NPS would coordinate with the State Historic Preservation Office regarding appropriate response actions and mitigation measures. The exact type(s) and cost of the mitigation cannot be calculated at this time.

Section 106 Determinations

Under Section 106 of the National Historic Preservation Act, the removal of buildings and change in the use and setting of the District would result in a determination of adverse effect. Implementation of this alternative would remove all contributing buildings within the historic district, and its integrity would be lost.

As discussed under the previous archeology discussion, the potential effects to archeological resources under the No Action Alternative could also result in a determination of adverse effect under Section 106 if the proper avoidance or protective strategies for archeological resources that could be potentially impacted are not implemented.

All mitigation will be determined through formal consultation with the Tennessee State Historic Preservation Office, the Advisory Council on Historic Preservation and the Chickasaw Nation and Eastern Band of the Cherokee Indians Tribal Historic Preservation Officers. The exact type(s) and cost of the mitigation cannot be calculated at this time.

4.2.2 Impacts on Natural Resources

Impacts to natural resources due to implementation of the No Action Alternative would result primarily from ground- disturbing activities. The No Action Alternative proposes removal of all historic buildings and may include seeding to reestablish vegetation on former building sites and other areas disturbed during project implementation. Soil erosion may occur in these areas and an immediate protective cover would help prevent erosion. Otherwise, native plants would be allowed to regenerate naturally in this alternative. Impacts generally include negligible, short- term, adverse effects and long-term, beneficial effects, as discussed below.

4.2.2.1 Soils

Whenever ground- disturbing activities take place there is a possibility of increased erosion. Erosion increases as runoff rates increase in areas where vegetation has been removed or where soils have been compacted by heavy machinery. The No Action Alternative proposes removal of all of the historic buildings in the District. During project implementation, soils would be disturbed if access by heavy machinery or other equipment is necessary for removal of the buildings and structures. Although the direct, adverse effects on soils would be widespread across the District, they would occur during project implementation and would be negligible and short- term. These effects would be mitigated somewhat by protocols established by the Park (see Section 2.2.1),

such as permitting the use of low ground pressure equipment only (except for hauling on existing roadways) and removal of buildings by hand in sensitive areas. In addition, all areas where there has been ground disturbance would be seeded with native species following project completion.

The indirect effect on soils associated with implementing the No Action Alternative would be long- term, major and beneficial, primarily because a large area of impervious surfaces (approximately 2.4 acres; Table 4- 3) would be eliminated following removal of all 74 buildings. The soils underlying the buildings have various infiltration capacities, depending on the soil structure and extent of prior compaction. While the permeability of soils underneath the buildings cannot be estimated accurately without extensive sampling, it is reasonable to assume that these soils maintain a higher infiltration capacity than man- made buildings, parking areas and other highly impermeable surfaces. Exceptions to this increased infiltration capacity would include those areas containing shallow or exposed bedrock. Increased infiltration and associated decreases in runoff and soil erosion would provide major, long- term, beneficial effects on soils and to adjacent waterways. Once vegetation is restored in areas formerly occupied by buildings, the plants would provide additional protection from erosion by preventing rain from falling directly on bare soils and by stabilizing soils with their root systems. No cumulative effects on soils are anticipated under the No Action Alternative.

4.2.2.2 Biotic Communities

4.2.2.2.1 Terrestrial Plant Communities

There would be direct, short- term, negligible, adverse effects to biotic communities during implementation of the No Action Alternative. These effects would occur during project implementation, primarily because gaining access to buildings slated for removal and hauling building materials off- site would require the use of heavy equipment. Protocols for project operations and impact avoidance measures have been developed by the Park to minimize the potential for adverse effects to biotic communities (see Section 2.2.1). Even with incorporation of these measures, the nature of the work may result in unavoidable damage to tree limbs and crushing of herbaceous vegetation.

The overall indirect effect to biotic communities in the District would be major, long- term, and beneficial, resulting from an increase in wildlife habitat and improvements to the quality of existing habitat. The plant community types found in the District have become established primarily due to variations in topography, slope, aspect, soil type, proximity to surface water and the effects of prior disturbance. Over time, the sites formerly occupied by buildings would provide opportunities for forest regeneration and would gradually enlarge the existing plant communities of the District.

In the Wonderland Club, there are primarily two forest types that would have the opportunity to expand. They include Appalachian montane oak- hickory forest and eastern white pine successional forest, dominated by eastern hemlock. In Millionaire's Row, the floodplain contains Appalachian montane oak- hickory forest, early successional Appalachian hardwood dominated by tulip poplar, and southern Appalachian cove forest. The occurrence of large sycamore trees in

portions of the Little River and tributary floodplains indicates that these floodplain areas contain the heavily impacted montane alluvial forest, a community that is globally imperiled. Tributaries to the Little River outside of the floodplain may have many of the same overstory species and may be classified as the same community type, but they typically lack the biological and structural diversity of the floodplain forest located within the floodplain of larger rivers and streams. Removal of buildings throughout floodplain areas and cessation of chronic disturbance would allow for gradual succession back to this forest type.

In Society Hill and Daisy Town, forested areas have been considerably disturbed by past human activity. Plant communities present include early successional Appalachian hardwood forest dominated by tulip tree and red maple, with smaller areas of Appalachian montane oak- hickory, southern Appalachian cove, chestnut oak, and Virginia pine successional forest communities.

Removal of buildings throughout the District would eliminate the need to perform hazard tree removal beyond that which is done adjacent to trails and within the Elkmont Campground. Every year, the NPS removes approximately 600 hazard trees from campgrounds throughout the Park to provide for visitor safety. Throughout the remainder of the District, most of the hazard trees surrounding the historic buildings have not been removed since the grounds and buildings have been closed to the public. Implementation of the No Action Alternative would eliminate the need for hazard tree management above that which is currently performed in the District and would eventually allow forests to reach the old growth stage of development.

Within the study area, the globally imperiled montane alluvial forest would have an opportunity to expand up to 22 acres (9 hectares) throughout floodplain and wetland areas (see Table 4- 3) once the buildings are removed and hazard tree management is no longer necessary in these areas.

4.2.2.2.2 Aquatic Communities

Direct, short- term, negligible, adverse effects to aquatic communities could result during implementation of the No Action Alternative. These effects would occur during project implementation, primarily due to the ground disturbance, potential erosion, and runoff into surface waters that could occur following the use of heavy equipment. Protocols for project operations and impact avoidance measures have been developed by the Park to minimize the potential for adverse effects to biotic communities (see Section 2.2.1). Even with incorporation of these measures, the nature of the work may result in unavoidable, yet negligible discharges of sediment into aquatic environments.

The overall indirect effect to aquatic resources in the District would be minor, long- term, and beneficial, resulting from an increase in the vegetation in abutting plant communities due to increased infiltration and associated decreases in runoff and soil erosion. Once vegetation is restored in areas formerly occupied by buildings, the plants would provide protection from erosion by preventing rain from falling directly on bare soils and by stabilizing soils with their root systems.

4.2.2.3 Threatened, Endangered, Rare and Sensitive Species

The No Action Alternative would have no direct effects on federally- listed threatened and endangered species since none of these species are known to occur within the proposed project implementation area. However, there may be indirect, minor, beneficial effects to several species due to habitat improvements. Removal of the buildings and revegetation of disturbed areas would eventually expand and improve the wildlife habitat in the District. A state threatened species, butternut, and two State Special Concern species, Fraser's sedge (*Cymophyllus fraserianus*) and chamomile grapefern (*Botrychium matricariifolium*) occur within the District. Implementation of the No Action Alternative provides the potential for existing populations of these species to expand into revegetated areas. Similar benefits would also be provided to state- listed species for which the District contains potential habitat. Those species include running bittercress, rough hawkweed, Fraser's yellow loosestrife, broadleaf bunchflower, yellow nodding lady's tresses, peregrine falcon, common raven, North American river otter, longhead darter, and northern pine snake. Site- specific surveys would be conducted before implementing specific actions to determine if special status species existed in the project area. If any were located, the Park would consult with the U.S. Fish and Wildlife Service and the state of Tennessee to determine measures to avoid, minimize, or mitigate adverse effects on the species.

The hellbender (*Cryptobranchus alleghaniensis alleghaniensis*) is a large aquatic salamander with a state designation of "deemed in need of management" (similar to State Special Concern status for plant species). This salamander is not known to occur at Elkmont, but a population does exist within the Little River, downstream from "The Sinks", a natural waterfall located within the Park. As a result, any actions in the District that could impact habitat downstream or water quality within the Little River could indirectly affect the hellbender. Short- term, adverse effects to water quality during construction are expected to be negligible. Following project implementation, expansion of the available area for infiltration should benefit water quality, indirectly providing minor benefits to aquatic species downstream such as the hellbender.

Although it is not a federally or state- listed species, or considered rare, the welfare of the synchronous firefly species that has been observed in the District is of concern to the NPS and the public who visit the District annually to view this species. The synchronous firefly population at Elkmont would likely experience a short- term, moderate benefit from expanded habitat as well. Since most of the buildings are located near streams or rivers, their removal could increase moist grassy areas where synchronous fireflies are often found. The firefly has also been observed in cleared areas and grassy areas along roadways in the District. Over the long term, without management to sustain those herbaceous habitats, woody vegetation will eventually encroach upon the area, possibly affecting the synchronism of this species. At this time, the role of synchrony in the ecology of this species is poorly understood, so it is difficult to quantify potential impacts.

4.2.2.4 Wetlands

Short- term, direct, minor adverse effects to wetlands would occur during project implementation as a result of disturbance created by heavy equipment in wetlands within Millionaire's Row. Although protocols have been established to avoid the potential for impacts to sensitive areas, the environment of the wetlands along Bearwallow Branch is

not suitable for machine traffic or even heavy pedestrian traffic due to saturated soil conditions. Although these wetlands would be disturbed during project implementation, this disturbance would be temporary and further minimized through seeding of native species over disturbed soils. However, wetlands may indirectly experience long- term, moderate, beneficial effects following removal of adjacent buildings. The environment surrounding residential buildings is subject to runoff from impervious surfaces, and has experienced soil compaction, deposition of petrochemicals from automobiles, heating and other household uses, planting of non- native species and vegetation management practices not consistent with those required to propagate native plant communities. These types of chronic disturbances in the past resulted in loss of native plant diversity and subsequent degradation of wildlife habitat. Therefore, wetlands that abut residential properties, such as those found in Millionaire's Row, would benefit from elimination of these chronic disturbances.

In addition, implementing the No Action Alternative would provide indirect, long- term benefits to wetlands by improving several wetland functions and values, including wildlife habitat, aesthetic/visual quality, flood storage, water quality, fish/shellfish habitat and recreation. Increasing the wildlife habitat in areas adjacent to wetlands would benefit the habitat function by providing abutting upland buffer areas and allowing for increased diversity in both flora and fauna. Wildlife species that migrate into areas that were formerly occupied by buildings would be able to utilize wetland habitat nearby as well. The aesthetic/visual quality value of the wetland would be improved by seeding former building sites with native plant species. Removal of impervious surfaces would allow greater infiltration adjacent to wetlands. Both the water quality and, subsequently, the fish and shellfish habitat functions, could potentially improve due to the increased area available for infiltration, reduction in impervious surfaces, and subsequent decrease in sedimentation of surface waters. The recreational value of the wetlands potentially would also increase because removal of the buildings would provide more opportunity for recreation such as wildlife watching, wildflower identification, fishing, hiking and a variety of activities focused on observation and appreciation of biotic communities.

4.2.2.5 Water Quality

Effects to water quality resulting from implementation of the No Action Alternative would consist of short- term, direct, negligible, adverse effects during project implementation and minor, indirect and long- term beneficial effects following project completion. Because this alternative proposes removal of all historic buildings across all areas of the District, former building sites would experience ground disturbance from heavy equipment and movement of vehicles off of existing roadways to access the buildings and transport materials out of the District. Although Best Management Practices (BMPs) such as installation of silt fence would be followed, there would still be potential for short- term, negligible adverse effects to water quality from erosion and sedimentation of surface waters that could occur during project implementation. However, once the areas have been seeded and vegetation becomes established, approximately 2.41 acres of impervious surfaces would be eliminated, allowing for additional infiltration. Restoration of vegetation on exposed areas would create minor, long- term, beneficial effects by filtering out nutrients and sediments in surface water runoff that currently enters the District's waterways.

The USEPA maintains a list of constituents that are found in typical roadway and parking area rainfall runoff (Table 4- 4). The list provides a wide range of concentrations or typical loading for constituents such as heavy metals and petrochemicals. This range is due to the variables associated with the physical size and shape of typical roadway and parking area surfaces as well as their surface material, slope and vehicle density. Total annual rainfall runoff from impervious surfaces such as parking lots and roadways has been estimated for all alternatives and is provided at the end of this chapter in Table 4- 5. As the table indicates, both roadway and parking lot surface water runoff are expected to remain the same as the existing condition if the No Action Alternative is implemented. Therefore, roadway runoff would not affect water quality over and above the existing condition if the No Action Alternative was implemented.

4.2.2.6 Floodplains

There would be no direct effects to the 100- year floodplain of the Little River or its tributaries as a result of implementing the No Action Alternative. Long- term, indirect, moderate beneficial effects to these floodplains would be experienced through removal of buildings currently in and adjacent to the 100- year floodplain of Bearwallow Branch and the Little River. An increase in the area (3,520 sf) available for infiltration and flood storage would be a direct benefit due to removal of three buildings in the 100- year floodplain, (Miller (#46), Faust (#47), and Faust garage (#47A)), and their associated impervious surfaces. Another long- term, major, indirect benefit would be an increase in the area of associated plant communities, such as the Appalachian Montane Oak-Hickory Forest. In addition, the Appalachian Montane Alluvial Forest is expected to regenerate at former building sites and in the adjacent floodplain in the absence of disturbance from residential use of the area. Additional indirect, long- term, minor benefits would be provided because removal of buildings within and adjacent to floodplains would eliminate future ground disturbance and soil compaction associated with residential use.

4.2.2.7 Air Quality

Visitation to the District is not expected to change as a result of implementing the No Action Alternative. Although there would be a temporary increase in emissions due to operation of equipment, direct adverse effects would be short- term and negligible, occurring only during project implementation. These effects could be minimized by reducing equipment idling times, ensuring that all construction equipment is in good operating condition, and by performing removal during the time of year when ozone is least likely to form (April to September).

There would be no direct or indirect effects to air quality following project implementation and emissions would remain the same as the existing condition. Based on a busy Saturday in summer, the emissions of the key air pollutants from the No Action Alternative in 2015 are projected to be 50.37 tons per year of NOx and 72.64 tons per year of VOCs. These figures represent “worst case” scenario concentrations, and may be experienced on only a few days per year. Table 4- 8 at the end of this chapter provides a comparison of estimated post- construction emissions for each project alternative.

4.2.3 Impacts on Interpretation and Visitor Use

Implementation of the No Action Alternative would create no effects on interpretation and visitor use. The number of visitors to the District is not expected to change and there would be no change in current interpretive programs conducted in the District.

4.2.3.1 Visitor Experience

Visitor experience would change as a result of implementing the No Action Alternative. A number of variables affect how visitors perceive their experience at Elkmont Historic District, including expectations, past experiences, the number of other visitors they encounter, their experience with nature, the condition of visitor facilities and the quality of the programs in which they participate. Implementation of the No Action Alternative would have indirect, long- term, major, beneficial effects by removing the buildings from the landscape because of their current condition.

Currently, the buildings and associated grounds are closed to the public. However, the District allows for multiple opportunities to view the extant cultural landscape, including the buildings and smaller- scale elements, from existing roadways. If the No Action Alternative were implemented, the appearance of the District's cultural landscape would change as a result of building removal. Interpretive opportunities would include ranger-led activities in the District, on- going publications and trail use, as well as examination of remaining features (stone walls, foundations, chimneys and other remnants of the historic buildings) and the remaining cultural landscape features such as the axial views along roads and streams that are not building- dependent for their setting but help to define the District.

4.2.3.2 Visitor Facilities

Visitor facilities in the Elkmont Historic District consist of the Elkmont Campground, parking areas and trail access. Implementation of the No Action Alternative would occur when the campground is closed and during the time of year when visitation is lowest. However, alternate access to trails may have to be identified prior to project implementation so that some areas could be closed to provide for visitor safety as equipment moves through the area. The adverse effect of restricted access would be short- term (occurring only during project implementation) and negligible.

4.2.4 Impacts on Socioeconomic Environment

The No Action Alternative would have no direct, indirect or cumulative effect on the socioeconomic environment.

4.2.4.1 Population and Environment

The No Action Alternative would have no direct, indirect or cumulative effect on local or regional populations.

4.2.4.2 Land Use

The 1982 General Management Plan identifies two land use subzones within Elkmont Historic District, transportation and development. The transportation subzone consists primarily of public roadway corridors. The development subzone encompasses regions that include facilities for picnicking, camping, public and staff accommodations, historical and natural resource interpretation, parking, and park operation and maintenance (NPS 1982). Implementation of the No Action Alternative would indirectly

result in long- term, minor beneficial effects to land use. These effects would be achieved through opening the grounds to the public following removal of buildings and structures.

The eventual use of the District would remain consistent with the NPS land use zone designations in the 1982 General Management Plan. Implementation of the No Action Alternative would continue to allow for use of public roadway corridors, picnicking and camping at the Elkmont Campground, historical and natural resource interpretation through NPS programs and printed material, and accommodations at the existing quarters for Park staff.

4.2.4.3 Access and Circulation
During implementation, the No Action Alternative would have negligible, adverse, short- term effects on access and circulation. Although the buildings and grounds would remain closed during project implementation to prevent safety hazards to visitors, alternate access to trails in the area would be provided. To avoid impacting campground visitors, project activities would take place when the campground is closed (December to February). These measures would reduce the potential for adverse effects to existing access and circulation and would avoid disrupting circulation while the campground is open. During removal of the buildings, construction vehicles would add to the internal trips within the District and could cause minor delays.

Once project activities are completed, visitation is not expected to increase and the internal circulation is expected to remain consistent with that of the existing condition (see Tables 4- 6 and 4- 7 at the end of this chapter for a comparison of circulation between all alternatives). As a result, there would be no indirect effects on access or circulation in the District.

4.2.5 Impacts on Other Resources

4.2.5.1 Viewshed
Impacts to visual quality consist of changes that would alter or obstruct (1) visible landscape features from viewpoints established as part of this analysis; and (2) access and visibility to dominant or important viewpoints or sequences of viewpoints. The primary viewpoints or sequences of viewpoints within the District are from existing roadways and trails. Currently, the building grounds are closed to the public and access to many of the viewpoints within the District is prohibited due to safety concerns related to the condition of the buildings.

Because the General Management Plan is the existing management direction for Elkmont, the No Action Alternative establishes the baseline for this environmental analysis and the associated visual analysis. The buildings within the study area are considered obstructions to the natural viewshed that would be removed if the General Management Plan (this alternative) was implemented. All buildings would be removed under this alternative thereby restoring the natural viewshed of the study area. Permanent, direct, major, beneficial effects would be realized by removing 74 buildings from the landscape. Removal of these features are shown in photos 3 through 6A in Appendix D that depict the existing views of a variety of historic buildings and simulations of the potential views following removal of these buildings. In addition to

removing the buildings and restoring natural conditions, the No Action Alternative proposes to retain foundations, rock walls and other cultural landscape components that obstruct views of the District's natural resources. Direct, adverse impacts to the District viewshed are expected to occur during implementation of the No Action Alternative because of the presence of machinery and ground disturbance, but these effects would be short- term and negligible.

The viewshed sensitivity maps shown in the Visual Quality Assessment (Appendix D) indicate the areas visible from a variety of viewpoints throughout the District. The direct effect on the composite viewshed would also be long- term, major and beneficial under the No Action Alternative due to removal of buildings and structures. Composite viewshed areas (Figures 7, 8 and 9, Appendix D) would also be beneficially affected by building removal with regard to the area that is visible from the transportation corridors.

4.2.5.2 Soundscape

Direct, short- term, minor adverse effects to the soundscape are expected during implementation of the No Action Alternative. The high noise level of combustion-powered equipment (usually diesel) is expected to be the primary contributor to the sound level and can interfere with the ability of individuals near the work site and passersby to hear speech. Overall, noise created during project implementation would be relatively short in duration and restricted to daytime hours and during the time of year in which visitation is the lowest. For an area such as Elkmont Historic District, located in a National Park, the appropriate noise abatement category is B with an Equivalent Sound Level (Leq) of 67 A- weighted decibels (dBA). Category B applies to areas such as picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries and hospitals (see Section 3.5.2 for a detailed explanation of noise abatement categories and criteria). Peak noise levels from construction as measured at a distance of 50 feet may vary from 70 to 100 dBA. The major sources of noise during project implementation may include that created by removal of buildings and hauling materials. Following project completion, natural conditions away from the influence of rivers or creeks with little wind would likely continue to result in sound levels in the 35 dBA range. Projected average and maximum noise levels for all alternatives are provided in Table 4- 9.

No long- term direct or indirect effects on noise are expected to occur as a result of implementing the No Action Alternative. It is expected that, following implementation of the No Action Alternative, future noise levels would likely be in the range of 50 to 60 dBA, with levels in areas that would revert to natural conditions at approximately 35 dBA. Since projected noise levels would remain the same as the existing condition, the No Action Alternative would have no effect on noise levels in the District once construction activities are completed.

4.2.6 Impacts on NPS Operations

Although the No Action Alternative would have no direct effects on NPS operations following project implementation, it would have indirect major beneficial effects on NPS operations due to removal of the Elkmont buildings. These effects would be permanent, and achieved primarily through elimination of the resources necessary to monitor and maintain the buildings. Currently, the historic buildings within the District are in various stages of disrepair. The NPS makes necessary repairs to the buildings on a regular basis.

In addition, the buildings have the potential to contain a variety of hazards, such as hanta virus, histoplasmosis, and lead- based paint.

General maintenance (litter pick- up, mowing, vegetation management, etc.) and some law enforcement would still be required. The NPS routinely removes hazard and fallen trees adjacent to roads and paths. Many trees have fallen directly on the buildings, requiring removal of the tree, as well as additional measures to repair damage to the buildings. Some of the expenditures required for hazard tree management adjacent to the buildings would be eliminated as buildings are removed; indirectly creating a permanent, major benefit for NPS operations through a reduction in costs associated with staff time and equipment needs. Removal of buildings would not completely eliminate the need for hazard tree management, but would reduce NPS expenditures currently used to repair the buildings. Even if buildings are removed, the NPS must still manage hazard trees to provide for visitor safety. In moist cove forest communities, such as those found in the District, research has shown that between 1.0 and 1.5 percent of canopy trees fail on an annual basis (Runkle 1982). Therefore, hazard trees adjacent to exhibits, trails and roadways are also removed to reduce the possibility that visitors could be harmed by falling trees. This practice would continue at its current level.

4.2.7 Cumulative Effects

Long- term, major, beneficial cumulative effects to biotic communities, potential habitat for threatened, endangered, rare and sensitive species, wetlands, water quality, and floodplains would be provided through implementation of the No Action Alternative. These effects would result from removal of historic buildings throughout the District. Reestablishment of native plant communities at the former building sites would provide multiple benefits to aquatic, wetland and terrestrial environments through soil stabilization and reduction in erosion and sedimentation of surface waters. In addition, implementation of the No Action Alternative would provide an opportunity for reestablishment of areas of the globally imperiled montane alluvial forest, helping to ensure the sustainability of this rare community.

The Little River is one of only six Outstanding National Resource Waters in the state of Tennessee. This designation is indicative of the pristine nature and excellent water quality in the river. Although water quality in the Little River and its tributaries has remained excellent, contributions of sediments from erosion or petrochemicals from parking area runoff can add to the existing load already entering the river system from the high number of visitors to the Park and surrounding gateway communities. Reduction of runoff and elimination of erosion help to lower the potential for contaminants to enter the river, further protecting it from degradation.

Revegetation of native plant communities not only increases total vegetation cover, but also increases the area of available habitat for a variety of fauna. Invasive, non- native plant species thrive in disturbance areas. Failing to continue a comprehensive, invasive, non- native species management program at the District could, over time, result in the spread of those species into other areas of the Park adding exponentially to the existing adverse effects that invasive species have on the Park's botanical diversity.

The permanent, major, adverse effect on cultural resources in the No Action Alternative is significant in a cumulative sense as well. While the Park contains a variety of historic

buildings and cultural landscape components, the District buildings represent the only remaining settlement of its type and time period in the Park. Other resort properties representing this time period, such as hotels and lodges inside the Park, and hotel and cabin communities outside the Park, have either been removed or may no longer retain historic integrity. When added to past actions, implementation of this alternative would contribute to the cumulative loss of buildings from this period in southern Appalachian history. There are no cumulative effects to other resources resulting from activities proposed in the No Action Alternative when combined with effects resulting from project activities and foreseeable effects caused by other related undertakings.

4.2.8 Conclusion

Implementation of the No Action Alternative would result in maintenance and / or enhancement of the long- term productivity of many of the natural resources, including soils, floodplains, aquatic and terrestrial communities, wetland functional values, habitat for threatened, endangered, rare and sensitive species, and water quality. In general, the overall long- term productivity of all biotic resources would be benefited by the increase in land available for restoration of native plant communities. Removal of buildings and structures throughout the District would also increase the area available for reestablishment of the globally imperiled montane alluvial forest. In addition, restored vegetation adjacent to floodplains, wetland and tributaries would further protect water quality of the Little River, an Outstanding National Resource Water. Visual quality, aesthetics and NPS operations would also benefit from the No Action Alternative due to the removal of buildings that currently degrade visual quality and require NPS staff and funding to maintain and stabilize. Opening the grounds following removal of the buildings would provide minor benefits to land use as well.

However, irretrievable commitments of resources would result if the No Action Alternative was implemented. These commitments would be created primarily by removal of the historic buildings within the District. This loss of cultural resources would significantly alter the characteristics of the Elkmont Historic District and this major adverse effect would be permanent. There is also potential for irreversible impacts to archeological resources as a result of implementation of this alternative, but it is possible that those effects could be eliminated or minimized through proper planning and avoidance measures.

Unavoidable adverse impacts associated with implementing the No Action Alternative are primarily direct, short- term, and negligible and would affect soils, biotic communities, noise, air quality, visitor experience, visitor use, access and circulation, and aesthetics and viewsheds. These effects would result from the disturbance created by construction operations and would be restricted to the project implementation period.

4.3 Impacts of Alternative A

Alternative A entails the removal of all historic buildings in the District, either by mechanical means or by hand. Foundations, chimneys, stone walls, and other cultural landscape features would be removed above ground level. However, features that would require considerable ground disturbance to be removed would be left in place. These actions would be followed by active restoration of native plant communities and development of a comprehensive invasive, non- native plant species monitoring and management plan. This plan would supplement the invasive, non- native species management already occurring in the District and would include an inventory of plant communities and allocation of resources for long- term implementation of the plan. Visitation as a result of implementing Alternative A is not expected to change measurably and current recreational activities in the District would continue to occur. In addition to the active restoration of native plant communities, the Park would continue to implement its current natural resource management activities. New exhibits are proposed under this alternative, including one discussing the natural history of synchronous fireflies and another presenting the history of the Town of Elkmont. The Elkmont Nature Trail brochure would be updated to include natural and cultural history information.

4.3.1 Impacts on Cultural Resources

Buildings and Cultural Landscape

The historic buildings in the Elkmont Historic District would be removed under Alternative A. This action would constitute a direct, permanent, major, adverse effect on the National Register- listed District and its cultural landscape, as would the change in use and setting (36 CFR 800.5[a][1] and [2]). The use and setting of the District would change from that of a built, historic area to an actively restored natural area. Most of the landscape characteristics and features ("spatial organization", "topography and vegetation", "buildings and structures", and "small- scale features"; see Table 3- 3) would experience permanent, major, adverse effects, principally because of the removal of all of the historic buildings from the District and many of the surviving small- scale features. There would be no indirect effects on the District's cultural landscape.

Several components of this alternative would provide direct, long- term, minor benefits to cultural resources. Some cultural landscape characteristics and features, including the axial views from the roadways and streams, and a number of small- scale features such as the footbridge over Bearwallow Branch would be retained. In addition, cultural resource information on Elkmont would be added to the Elkmont Nature Trail brochure and an exhibit on the history of the Town of Elkmont would be installed.

Archeological Resources

As with all alternatives, the potential for Alternative A to impact archeological resources depends on the level, extent and location of ground- disturbing activities. Since Alternative A proposes removal of all the buildings in the District, there is potential to impact archeological resources, but the potential is less than those alternatives that require installation of new sewer lines, water lines or parking lots. All impacts would be direct, permanent, adverse, and could be major. The areas where archeological resources could potentially be adversely affected include one locus where a significant resource has been documented, four loci where potentially significant resources have

been identified, and two areas that have not yet been surveyed. There would be no effect on potentially significant resources at 12 loci. These potential impacts are identical to those for the No Action Alternative. The ultimate impacts to archeological resources due to project implementation would depend on the outcome of additional investigations. NPS staff would continue established resource protection measures for the identification and treatment of archeological resources on a case- by- case basis. The proper execution of avoidance or protective strategies could ensure that no effect on archeological resources would occur.

Section 106 Determinations

Under Section 106 of the National Historic Preservation Act, removal of buildings and the majority of the cultural landscape characteristics and features, along with the change in the use and setting of the District, would result in a determination of adverse effect. Implementation of this alternative would remove all contributing buildings within the historic district, and its integrity would be lost.

As discussed under the previous archeology discussion, the potential effects to archeological resources under Alternative A could also result in a determination of adverse effect if the proper avoidance or protective strategies for archeological resources are not implemented.

All mitigation will be determined through formal consultation with the Tennessee State Historic Preservation Office, the Advisory Council on Historic Preservation and the Chickasaw Nation and Eastern Band of the Cherokee Indians Tribal Historic Preservation Officers. The exact type(s) and cost of the mitigation cannot be calculated at this time.

4.3.2 Impacts on Natural Resources

Impacts to natural resources due to implementation of Alternative A would be created primarily from ground- disturbing activities and restoration of native plant communities. Alternative A proposes removal of all historic buildings, restoration of areas where there has been ground disturbance and implementation of an annual management plan to control invasive, non- native species and improve wildlife habitat. Impacts would generally include short- term, minor, adverse effects during and shortly following construction, and long- term, beneficial effects. These effects are discussed below for each natural resource.

4.3.2.1 Soils

This alternative proposes removal of 74 buildings in the District. Although there would be no excavation to remove buried foundations and other buried features, those components would be removed if removal can be accomplished without causing additional ground disturbance. The only grading necessary would be that required to blend the topography of the former building sites into the surrounding landscape. For example, a stone pier or above- ground foundation might be removed, as would other surface features, but excavation to remove the rock walls lining the road through Daisy Town would not be undertaken.

Whenever ground- disturbing activities take place there is potential for soil compaction and increased erosion due to removal of vegetation and compaction of soils by

construction equipment. Therefore, short- term, negligible adverse effects on soils would occur during project implementation if access by heavy machinery or other equipment is necessary for removal of the buildings. These effects would be mitigated by protocols established by the Park, such as only permitting the use of low ground pressure equipment, except for hauling on existing roadways, and removal of buildings by hand in sensitive areas. In addition, all areas where there has been ground disturbance would be seeded or planted with native species following project completion. Therefore, although the adverse effects on soils would be widespread across the District, they would be temporary.

As described in the No Action Alternative, approximately 2.41 acres of impervious surfaces would be eliminated when the buildings are removed, resulting in benefits to soils. Reducing the area of impervious surfaces should allow for increased infiltration and decreased rates of runoff and soil erosion, providing major, long- term beneficial effects to soils and abutting waterways. Once vegetation is reestablished in areas formerly occupied by buildings, plants would provide additional protection from erosion by preventing rain from falling directly on bare soils and by stabilizing soils with their root systems. The beneficial effects provided by the vegetation would increase as the density of the plants increases.

4.3.2.2 Biotic Communities

4.3.2.2.1 Terrestrial Plant Communities

As in the No Action Alternative, direct, adverse effects to biotic communities would result during construction as a result of disturbance of vegetation communities by construction equipment and foot traffic. These effects would be short- term and negligible. Indirectly, Alternative A would provide major, long-term benefits to biotic communities consisting primarily of increasing and improving the quality of wildlife habitat; reducing impervious surfaces and associated runoff; reestablishing native plant communities to provide botanical diversity and additional habitat; and reducing potential threats to water quality in the Little River.

In addition to the beneficial effects to biotic communities as described in the No Action Alternative, this alternative includes active restoration of the entire District, including restoration of sites formerly occupied by buildings. As described in the No Action Alternative, removal of the buildings would allow a variety of plant community types to increase in area. These communities include Appalachian montane oak- hickory forest and eastern white pine successional forest dominated by eastern hemlock in the Wonderland Club. In Millionaire's Row, the Little River floodplain contains Appalachian montane oak- hickory forest, early successional Appalachian hardwood dominated by tulip poplar, and southern Appalachian cove forest areas could potentially expand. The occurrence of large sycamore trees in portions of the Little River and tributary floodplains indicates that these floodplain areas contain the heavily impacted montane alluvial forest, a community that is globally imperiled. Tributaries upslope of the Little River floodplain may have many of the same overstory species and may be classified as the same community type, but they typically lack the biological and structural diversity of the floodplain forest located within the

floodplain of larger rivers and streams. Removal of buildings throughout floodplain areas and cessation of chronic disturbance would allow for gradual succession back to this forest type.

In Society Hill and Daisy Town, forested areas experienced considerable disturbance due to past human activity. Plant communities present include early successional Appalachian hardwood forest dominated by tulip tree and red maple, with smaller areas of Appalachian montane oak- hickory, southern Appalachian cove, and Virginia pine successional forest communities.

In addition, removal of buildings throughout the District would eliminate the need to perform hazard tree removal beyond that which is done adjacent to trails and within the Elkmont Campground. As discussed in the No Action Alternative, implementation of Alternative A would eventually allow old growth canopy and understory vegetation to become reestablished. Within the study area, the globally imperiled montane alluvial forest would have an opportunity to expand up to 22 acres (9 hectares) throughout floodplain and wetland areas (see Table 4-3) once the buildings are removed.. Because no work is proposed in floodplains or wetlands under Alternative A, the potential for reestablishment of the montane alluvial forest is the same as that which would occur under the No Action Alternative.

Some areas of the District have been planted or infiltrated with invasive, non-native vegetation that reduces native species diversity and degrades the quality of wildlife habitat. Long- term management to control these plant species would provide additional benefits over and above those described in the No Action Alternative. The District has been surveyed by the NPS for invasive, non- native plant species and some treatment for control of those species has occurred. Alternative A proposes to dedicate funding to support management planning and staff to develop a comprehensive invasive, non- native species eradication plan throughout the District that would be implemented annually. This plan could be revised periodically as conditions change to continue to meet the objective of invasive, non- native species eradication. Over time, this management would benefit native plant populations by reducing competition, protecting hemlock communities from woolly adelgid infestation and increasing suitable habitat for wildlife species known to exist within the District. Alternative A would also provide long- term, major, indirect benefits to biotic communities by eliminating a potential source of invasive, non- native species that could spread to other areas of the District.

4.3.2.2.2 Aquatic Communities

Direct, short- term, negligible, adverse effects to aquatic communities could result during implementation of Alternative A. These effects would occur during project implementation, primarily due to the ground disturbance, potential erosion, and runoff into surface waters that could occur following the use of heavy equipment. Protocols for project operations and impact avoidance measures have been developed by the Park to minimize the potential for adverse effects to biotic communities (see Section 2.2.1). Even with incorporation of these

measures, the nature of the work may result in unavoidable, yet negligible discharges of sediment into aquatic environments.

The overall indirect effect to aquatic resources in the District would be minor, long- term, and beneficial, resulting from an increase in the vegetation in abutting plant communities due to increased infiltration and associated decreases in runoff and soil erosion. Once vegetation is restored in areas formerly occupied by buildings, the plants would provide protection from erosion by preventing rain from falling directly on bare soils and by stabilizing soils with their root systems.

4.3.2.3 Threatened, Endangered, Rare and Sensitive Species

Like the No Action Alternative, Alternative A would not directly affect federal- listed endangered or threatened species since none are known to occur within or adjacent to the project implementation area. However, removal of the buildings and restoration of disturbed areas would indirectly provide long- term, minor benefits by eventually expanding and improving wildlife habitat. A state threatened species, butternut, and two State Special Concern species, Fraser's sedge (*Cymophyllus fraserianus*) and chamomile grapefern (*Botrychium matricariifolium*) occur within the District. Implementation of Alternative A would create the potential for existing populations of these species to expand into revegetated areas. Similar benefits would also be provided to state- listed species for which the District contains potential habitat. Those species include running bittercress, rough hawkweed, Fraser's yellow loosestrife, broadleaf bunchflower, yellow nodding lady's tresses, peregrine falcon, common raven, North American river otter, longhead darter, and northern pine snake. Site- specific surveys would be conducted before implementing specific actions to determine if special status species existed in the project area. If any were located, the Park would consult with the U.S. Fish and Wildlife Service and the state of Tennessee to determine measures to avoid, minimize, or mitigate adverse effects on the species. In addition, active management of invasive, non- native species would provide further long- term, minor benefits by improving species diversity.

The hellbender (*Cryptobranchus alleghaniensis alleghaniensis*), is a large aquatic salamander with a state designation of "deemed in need of management" (similar to State Special Concern status for plant species). This salamander is not known to occur at Elkmont, but a population does exist within the Little River, downstream from "The Sinks", a natural waterfall located within the Park. As a result, any actions in the District that could impact habitat downstream or water quality within the Little River could indirectly affect the hellbender. Short- term, adverse effects to water quality during construction are expected to be negligible. Following project implementation, expansion of the available area for infiltration and active restoration of plant communities should benefit water quality, indirectly providing minor benefits to aquatic species downstream such as the hellbender.

Although it is not federally or state- listed, the synchronous firefly species that has been observed in the District would likely benefit from expanded habitat as well. Alternative A, like the No Action Alternative, proposes removal of buildings over approximately 2.4 acres. Since most of the buildings are located near streams or rivers, their removal could increase moist grassy areas where synchronous fireflies are often found. The firefly has also been observed in cleared areas and grassy areas along roadways in the District. Elimination of the open, herbaceous habitat may affect the synchrony of the fireflies;

however, at this time, the role of synchrony in the ecology of this species is poorly understood, so it is difficult to quantify potential impacts.

4.3.2.4 Wetlands

Short- term, direct, minor adverse effects to wetlands would occur during project implementation as a result of disturbance created by heavy equipment in wetlands within Millionaire's Row. Although protocols have been established to avoid the potential for impacts to sensitive areas, the environment of the wetlands along Bearwallow Branch is not suitable for machine traffic or even heavy pedestrian traffic due to saturated soil conditions. Although these wetlands would be disturbed during project implementation, this disturbance would be temporary and further minimized through seeding of native species over disturbed soils. However, over the long term, wetlands would be indirectly benefited by removal of adjacent buildings and invasive, non- native species control. These effects would be major, primarily created by removal of chronic disturbance of wetland and abutting upland plant communities. The environment surrounding residential buildings has been subject to runoff from impervious surfaces, soil compaction, deposition of petrochemicals from automobiles and other household uses, planting of invasive, non- native species by prior residents, and vegetation management practices not conducive to the establishment of native plant communities. These types of disturbances result in loss of native plant diversity and subsequent degradation of wildlife habitat. Therefore, wetlands that abut residential properties would benefit from elimination of these chronic disturbances.

Indirectly, Alternative A would also create long- term, moderate beneficial effects by increasing several wetland functions and values, including wildlife habitat, aesthetic/visual quality, flood storage, water quality, fish/shellfish habitat and recreation. Improving the wildlife habitat in areas adjacent to wetlands would enhance the wildlife habitat function by providing additional upland habitat and by increasing botanical diversity. Wildlife species that migrate into areas formerly occupied by buildings would utilize wetland habitat nearby as well. The aesthetic/visual quality value of the wetland would be improved by planting former building sites with native plant species. Removal of impervious surfaces would allow greater infiltration adjacent to the wetlands. The water quality and subsequently, the fish and shellfish habitat functions would improve due to the increased area available for infiltration, reduced area of pervious surfaces and lower potential for erosion and sedimentation of wetlands. In addition, repair of culverts to correct erosion problems would provide indirect benefits by ensuring that additional erosion and sediment- laden water does not make its way into abutting wetlands or floodplains. The recreational value of the wetlands potentially would increase because removal of the buildings would provide more opportunity for recreation such as wildlife watching, wildflower identification, fishing, hiking, and a variety of activities focused on observation and appreciation of biotic communities.

4.3.2.5 Water Quality

Like the No Action Alternative, Alternative A proposes removal of all historic buildings across all areas of the District and effects to water quality are similar to those described in the No Action Alternative. During construction, the possibility for short- term, minor adverse effects to water quality exists due to increased potential for erosion and sedimentation of surface waters. Due to restoration of native vegetation, following

construction the potential exists for minor, long- term, benefits due to increased soil stabilization, reduction of impervious surfaces (2.4 acres) and reduced runoff.

4.3.2.6 Floodplains

As described in the No Action Alternative, there would be no direct effects to the 100-year floodplain of the Little River or its tributaries as a result of implementing Alternative A. Long- term, indirect, moderate beneficial effects to these floodplains would be experienced through removal of buildings currently in and adjacent to the 100- year floodplain of Bearwallow Branch and the Little River. An increase in the area (3,520 sf) available for infiltration and flood storage would be a direct benefit due to removal of three buildings in the floodplain, (Miller (#46), Faust (#47), and Faust garage (#47A)), and their associated impervious surfaces. Another long- term, major, indirect benefit would be an increase in the area of associated plant communities, such as the Appalachian Montane Oak- Hickory Forest. In addition, the Appalachian Montane Alluvial Forest could, over time, regenerate at former building sites and in the adjacent floodplain in the absence of disturbance from residential use of the area. Additional indirect, long- term, minor benefits would be provided because removal of buildings within and adjacent to floodplains would eliminate future ground disturbance and soil compaction associated with residential use.

4.3.2.7 Air Quality

As in the No Action Alternative, projected visitation is not expected to change following implementation of Alternative A. However, there would be a temporary increase in emissions due to the operation of heavy equipment during project implementation. These effects could be minimized by reducing equipment idling times, ensuring that all construction equipment is in good operating condition, and by performing construction during the time of year when ozone is least likely to form (April to September). Therefore, direct adverse effects to air quality would be short- term in duration and negligible, occurring only during construction.

There would be no direct or indirect effects to air quality following project implementation. Based on a busy Saturday in summer, the emissions of two key air pollutants resulting from the condition created by Alternative A in 2015 are projected to be 50.37 tons per year of NOx and 72.64 tons per year of VOCs (see Table 4- 8). These figures represent no change from the existing condition.

4.3.3 Impacts on Interpretation and Visitor Use

Implementation of Alternative A requires removal of all historic buildings in the District. Implementation of this alternative is not expected to change the number of visitors to the area and there would be no change in current interpretive programs conducted in the District. Interpretive programs include illustrated talks, as well as guided hikes, that cover a wide range of topics such as art, music, history, Native American culture and nature. However, this alternative requires revisions to the Elkmont Nature Trail brochure to include natural and cultural history information and installation of two wayside exhibits. These provisions would create direct, long- term minor beneficial effects on interpretation by providing visitors with additional educational material related specifically to the District.

4.3.3.1 Visitor Experience

Like the No Action Alternative, implementation of Alternative A would have direct effects on visitor experience that are both adverse and beneficial, depending on the visitor's perception. For those visitors who see the historic buildings in the District as detracting from the aesthetic beauty of the natural environment, Alternative A would provide direct, permanent, beneficial effects by removing the buildings from the landscape. Conversely, visitors who see the historic buildings as an important visual asset to the District, this alternative would result in direct, permanent, adverse effects on their experience.

Visitor experience would change considerably as a result of implementing Alternative A. Currently, the buildings and adjacent grounds are closed to the public. However, the District allows for multiple opportunities to view the extant cultural landscapes, including the buildings and smaller- scale features from existing roadways. Thus, the focus on the portion of the District that contains buildings is on cultural resources within their setting. If Alternative A was implemented, visitor experience would change to one focused primarily on natural resource restoration with interpretive opportunities related to the cultural and natural history of the District limited to publications, brochures, nature trail guides, Ranger programs and two wayside exhibits.

4.3.3.2 Visitor Facilities

As described in the No Action Alternative, Alternative A would create short- term, negligible, adverse effects to visitor facilities during project implementation. These effects would be caused by temporary access restrictions to prevent visitors from entering construction areas. No additional facilities would be provided as part of Alternative A.

4.3.4 Impacts on Socioeconomic Environment

Alternative A would have no direct, indirect or cumulative effect on the socioeconomic environment.

4.3.4.1 Population and Environment

Alternative A would have no direct, indirect or cumulative effects on local or regional populations.

4.3.4.2 Land Use

As in the No Action Alternative, implementation of Alternative A would indirectly result in long- term, minor beneficial effects to land use. These effects would be achieved through opening the grounds to the public following removal of buildings and structures.

The eventual use of the District would remain consistent with the land use zone designations in the 1982 General Management Plan. Implementation of Alternative A would continue to allow for use of public roadway corridors, picnicking and camping at the Elkmont Campground, historical and natural resource interpretation through NPS programs and printed material, and accommodations at the existing quarters for Park staff.

4.3.4.3 Access and Circulation

During implementation, Alternative A would have negligible, short- term adverse effects on access and circulation. The buildings and grounds would remain closed during project implementation as a safety measure for visitors and alternate access to trailheads may need to be provided. To avoid impacting campground visitors, construction activities would take place when the campground is closed (December to February). These measures would greatly reduce the potential for adverse effects to access and circulation. During removal of the buildings, construction vehicles would add to visitor traffic to and from the District and could cause minor delays due to the reduced capacity for trucks carrying heavy loads to accelerate. However, in the long- term, because the level of service would remain the same with no change in average speed of travel, percentage of time spent following and headway between vehicles, there would be no effect on access and circulation following project implementation.

4.3.5 Impacts on Other Resources

4.3.5.1 Viewshed

Impacts to visual quality consist of changes that would alter or obstruct (1) visible landscape features from dominant viewpoints established as part of this analysis; and (2) access and visibility to dominant or important viewpoints or sequences of viewpoints. The primary viewpoints or sequences of viewpoints within the District are from existing roadways and trails. Currently, the building grounds are closed to the public and access to many of the viewpoints within the District is prohibited due to safety concerns related to the condition of the buildings.

The established baseline for this environmental analysis and the associated visual analysis is the No Action Alternative. This baseline identifies a naturally regenerated landscape within the study area as the condition for the visual analysis. Permanent, direct, major, beneficial effects would be realized by removing 74 buildings from the landscape. All buildings and structures would be removed under this alternative thereby restoring the natural viewshed of the study area. Alternative A would improve upon the No Action Alternative by actively restoring the native plant communities within the study area In addition to removing the buildings and restoring natural conditions, Alternative A proposes to remove foundations, rock walls and other cultural landscape components. Removal of these features would indirectly augment the long- term, major, beneficial effect on visual quality because these components create minor obstructions of views of the District's natural resources. Direct, adverse impacts to the viewshed are expected to occur during implementation of Alternative A because of the presence of machinery and ground disturbance, but these effects would be short- term and negligible.

The viewshed sensitivity maps shown in the Visual Quality Assessment (Appendix D) indicate the areas visible from a variety of viewpoints throughout the District. The direct effect on the composite viewshed would also be permanent, major and beneficial under Alternative A due to removal of buildings, structures and cultural landscape components. Composite viewshed areas shown (Figures 7, 8 and 9, Appendix D) would also be beneficially affected by building removal with regard to the area that is visible from the transportation corridors.

4.3.5.2 Soundscape

Direct, short- term, minor adverse effects on the soundscape are expected to occur during implementation of Alternative A due to construction activities. The high noise levels of internal combustion- powered equipment (usually diesel) are expected to be the primary contributor to sound levels during construction and can interfere with the ability of individuals near the work site to hear speech. Peak noise levels from construction as measured at a distance of 50 feet may vary from 70 dBA to 100 dBA. The major sources of construction noise in this alternative may include removal of buildings, hauling, grading, and paving. Overall, construction noise would be relatively short in duration and restricted to daytime hours at the time of year in which visitation is expected to be the lowest. Following implementation of Alternative A, noise levels would likely remain in the range of 50 to 60 dBA, with the exception of those areas that would be restored to natural conditions. Natural conditions away from the influence of rivers or creeks and with little wind would likely result in sound levels in the 35 dBA range (see Table 4- 9). As in the No Action Alternative, once construction activities are complete, anticipated noise levels would not exceed the noise abatement criteria of 67 dBA, and Alternative A would have no long- term effect on noise in the District.

4.3.6 Impacts on NPS Operations

There would be no direct effects on NPS operations following implementation of Alternative A. As under the No Action Alternative, there would be no changes to existing access or circulation within the District. However, there would be indirect major beneficial effects due to removal of the Elkmont buildings. The current condition of the buildings, and the fact that visitors continue to enter them (even though they are closed), necessitates that NPS make repairs. In addition, the buildings have the potential to contain hazards such as the hanta virus, a disease spread by rodents, and histoplasmosis, which is spread by bats. Both of these contagions can be fatal to humans who come into contact with them. Some of the buildings contain a variety of debris, ranging from broken glass and fallen plasterboard to lead- based paint. Removal of hazards that pose a danger to the visiting public would lower the potential for harm, reduce the need for NPS law enforcement in the District, and ultimately provide permanent, major benefits to NPS operations.

As with the No Action Alternative, general maintenance and some law enforcement would still be required to monitor visitor use and safety, but the need for any funds or staff to protect the buildings from vandalism or to continue to maintain the buildings to prevent further deterioration would be eliminated. The NPS routinely performs vegetation management in the District to remove hazard and fallen trees adjacent to roads and paths. Some of the expenditures required for vegetation management adjacent to the buildings would be eliminated as buildings are removed, indirectly creating a permanent, major benefit for NPS operations through a reduction in costs associated with staff time and equipment needs. Removal of buildings would not completely eliminate the need for vegetation management, but would reduce NPS expenditures currently used to repair the buildings. In moist cove forest communities, such as those found in the District, research has shown that between one and one and one- half percent of canopy trees fail on an annual basis (Runkle 1982). Therefore, as described in the No Action Alternative, removal of hazard trees would continue to be performed at its current level.

Once the project related work is completed, no additional operation and maintenance expenditures would be required beyond what the Park already budgets for the roads, parking, water and wastewater systems, and operations and staffing, with the exception of that required to create and implement a more comprehensive, long- range invasive, non- native species management plan.

4.3.7 Cumulative Effects

The cumulative effects of implementing Alternative A would consist of long- term major beneficial effects to natural resources and permanent, major, adverse effects to cultural resources.

Similar to the effects described for the No Action Alternative, Alternative A would result in long- term, major, beneficial cumulative effects to biotic communities, habitat for threatened, endangered, rare and sensitive species, wetlands, water quality, and floodplains. These effects would result from removal of buildings throughout the District. Reestablishment of native plant communities at the former building sites would provide multiple benefits to aquatic, wetland and terrestrial environments through soil stabilization and reduction in erosion and sedimentation of surface waters. Although water quality in the Little River and its tributaries has remained excellent, contributions of sediments from erosion or petrochemicals from pavement runoff can add to the existing load already entering the river system from the high number of visitors to the Park and surrounding gateway communities. Reduction of runoff and elimination of erosion help to lower the potential for contaminants to enter the river. At the same time, restoration of native plant communities not only increases total vegetation cover, but also increases the area of available habitat for a variety of fauna. Invasive, non- native plant species thrive in disturbance areas and permanent restoration with native species would create a long- term beneficial cumulative effect by reducing the area available for invasive, non- native species to become established, thereby decreasing the potential for these species to infiltrate into surrounding areas of the Park.

Effects on cultural resources are also similar to those described in the No Action Alternative. The direct, permanent, major, adverse effect on cultural resources in Alternative A is significant in a cumulative sense as well. While the Park contains a variety of historic buildings and cultural landscape components, the District buildings represent the only remaining collection of early 20th century resort cabins retaining integrity in the Appalachian Mountains of Tennessee (Thomason et al. 1993). Other resort properties representing this time period, such as hotels and lodges inside the Park, and hotel and cabin communities outside the Park, have either been removed or may no longer retain historic integrity. When added to past actions, implementation of this alternative would contribute to the cumulative loss of buildings from this time period in southern Appalachian history.

There are no cumulative effects to other resources resulting from activities proposed in Alternative A when combined with effects resulting from project activities and foreseeable effects caused by other related undertakings.

4.3.8 Conclusion

Like the No Action Alternative, implementation of Alternative A would result in maintenance and / or enhancement of the long- term productivity of many of the natural

resources, including soils, floodplains, aquatic and terrestrial communities, wetland functional values, habitat for threatened, endangered, rare and sensitive species, and water quality. In general, the overall long- term productivity of all biotic resources would benefit from the increase in land available for restoration of native plant communities and implementation of a comprehensive invasive, non- native species management plan. Removal of buildings and structures throughout the District would increase the area available for reestablishment of the globally imperiled montane alluvial forest. In addition, restored vegetation within and adjacent to floodplains, wetlands and tributaries would further protect would further protect water quality of the Little River, an Outstanding National Resource Water. Visual quality, aesthetics and NPS operations would also benefit from Alternative A due to the removal of buildings that currently degrade visual quality and require NPS staff and funding to maintain and stabilize. Minor benefits to land use would also be provided when the District grounds are opened following removal of the buildings and structures.

However, irretrievable commitments of resources would result if Alternative A was implemented. These commitments would be created primarily by removal of the historic buildings within the District. This loss of cultural resources would be permanent, major and adverse. There is also potential for irreversible impacts to archeological resources as a result of implementation of this alternative, but it is possible that those effects could be eliminated or minimized through proper planning and avoidance measures.

Unavoidable adverse impacts associated with implementing Alternative A are primarily direct, short- term, and negligible and would affect soils, biotic communities, noise, air quality, visitor experience, visitor use, access and circulation, and aesthetics and viewsheds. These effects would result from the disturbance created by construction operations and would be restricted to the project implementation period.

4.4 Impacts of Alternative B

Alternative B proposes retention of 12 cabins and the Appalachian Clubhouse in Daisy Town, and removal of all other historic buildings in the District, either by mechanical means or by hand. Visitation as a result of implementing Alternative B is not expected to change considerably; however, traffic within the District is expected to increase slightly (Table 4- 6). Existing recreational use would continue to occur. New exhibits are proposed under this alternative and the Elkmont Nature Trail brochure would be updated to include natural and cultural information on Elkmont. The Park would continue to implement its existing natural resource management activities.

Some changes to parking and circulation within the District would be required. Once this work was completed, a minor increase in operation and maintenance expenditures would be required beyond what the Park already budgets for the roads, parking, water and wastewater systems, and operations and staffing.

4.4.1 Impacts on Cultural Resources

Buildings and Cultural Landscape

Implementation of Alternative B would constitute an adverse effect on the Elkmont Historic District, entered in the National Register of Historic Places (NRHP) on March 22, 1994. Alternative B would remove 37 buildings listed as contributing in the NRHP nomination, including the remains of the Wonderland Hotel, the Wonderland Hotel Annex, 32 cabins and 3 garages. The alternative would retain 12 contributing buildings, including the Appalachian Clubhouse and 11 contributing cabins. Also as part of Alternative B, one additional non- contributing cabin would be retained, resulting in a total of 13 buildings retained under Alternative B. The majority of Elkmont's cultural landscape elements and features also would be retained under this alternative. Implementation of this alternative would compromise the overall layout and spatial patterns among the component resources of the historic district, and its integrity would be lost.

While the overall effect on the District would be adverse, because Alternative B incorporates the continued use of 13 historic buildings within the Appalachian Club into ongoing Park operations, the long- term preservation of these resources would be guaranteed and would be considered a beneficial effect. This particular area evokes the strongest sense of community within Elkmont and offers the greatest opportunity for visitors to understand the former vacation community and the broad cultural pattern of second- home vacation cabins from the early 20th century. Daisy Town also offers the best cross section of Elkmont's various construction techniques and building materials, as well as preserving the only "set- off" cabins in the Park. The Appalachian Clubhouse would be rehabilitated as a day- use rental for the public.

The cultural landscape characteristics and features of Elkmont, such as the historic swimming hole at Little River, stone walls and a footbridge over Bearwallow Branch, would be retained under this alternative as would other eligible cultural landscape features. The preservation of the retained cabins and rehabilitation of the clubhouse would be conducted in accordance with *The Secretary of the Interior's Treatment Standards*.

Where adequate documentation is available, all modern, exterior changes made to cabins that post- date 1940, will be restored to a point within the listed period of significance. This includes, but is not limited to, elements such as porch decking, porch posts and rails, modern additions and modern substitutions of original materials.

The Swan cabin (#4), considered non- contributing because it has lost its integrity, will be restored to a point within the period of significance. Conspicuous modern additions, such as the deck, side and rear rooms, will be removed from this building. Based on available documentation, building features that have been altered, such as the porch, posts, railings and foundation piers, will be restored or recreated to a point within the period of significance. This building will be restored to maintain the spatial relationship of the established streetscape in Daisy Town.

This alternative would introduce new visual elements into the District, including the orientation kiosk, eight wayside exhibits, four parking areas, and paths leading from the parking areas to exhibits. Indirect adverse effects on cultural resources would be minor, but long- term. These indirect effects would be caused by a modest increase in the number of internal trips to the restored buildings, along with wear and tear from pedestrian traffic to the Appalachian Clubhouse and, potentially, on the porches of the retained Daisy Town cabins. Overall visitation and use specified for most buildings and features is primarily interpretive under Alternative B.

The interpretive exhibits, parking areas, new paths and roads, and stream bank stabilization at eroded culverts would create minor adverse effect on District cultural resources. The proposed new elements would constitute a minimal visual change. In addition, the proposed parking areas, paths, and roads would be located in areas already visually impacted by existing roads, parking areas and modern buildings slated for removal. The proposed utility lines would be buried in the ground, thereby removing visually intrusive power poles that postdate the period of significance.

Archeological Resources

As with all alternatives, the potential for Alternative B to impact archeological resources depends on the level, extent and location of ground- disturbing activities. The Park will implement strategies to avoid or minimize any impacts on archeological resources. Alternative B proposes removal of fewer buildings than the No Action Alternative. The use of heavy equipment and transport of materials for structural rehabilitation, restoration and preservation could result in ground disturbance in Daisy Town as well. Installation of new water, sewer and electrical lines, and paving existing or creating new parking areas would result in additional disturbance that could also affect archeological resources. All of these adverse effects would be direct, permanent, and could be major.

The areas where archeological resources could potentially be adversely affected include one locus where a significant resource has been documented, six loci where potentially significant resources have been identified, and two areas that have not yet been surveyed. There would be no effect on potentially significant resources at ten loci. Compared to the No Action Alternative, this alternative includes two additional loci where potentially significant resources have been identified. Those resources could be adversely affected by installation of a water line and the Little River Trail parking area. The ultimate impacts to archeological resources due to project implementation would depend on the

outcome of additional investigations. NPS staff would continue established resource protection measures for the identification and treatment of archeological resources on a case- by- case basis.

Section 106 Determinations

Under Section 106 of the National Historic Preservation Act, removal of 37 contributing buildings within the NRHP listed Elkmont Historic District would constitute an adverse effect. Implementation of this alternative would compromise the overall layout and spatial patterns among the component resources of the historic district, and its integrity would be lost.

As discussed under the previous archeology discussion, the potential effects to archeological resources under Alternative B could also result in a determination of adverse effect if the proper avoidance or protective strategies for archeological resources are not implemented.

All mitigation will be determined through formal consultation with the Tennessee State Historic Preservation Office, the Advisory Council on Historic Preservation and the Chickasaw Nation and Eastern Band of the Cherokee Indians Tribal Historic Preservation Officers. The exact type (s) and cost of the mitigation cannot be calculated at this time.

4.4.2 Impacts on Natural Resources

Impacts to natural resources due to implementation of Alternative B would result primarily from ground- disturbing activities and road and parking lot construction. These effects are discussed below for each natural resource.

4.4.2.1 Soils

Whenever ground- disturbing activities take place there is potential for increased rates of erosion due to soil compaction and removal of vegetation. This alternative proposes removal of 61 buildings in Elkmont Historic District. Therefore, there would be short-term, moderate, adverse effects on soils during project implementation if access by heavy machinery or other demolition equipment is necessary for removal of the buildings. These effects would be mitigated by protocols established by the Park, such as only permitting the use of low ground pressure equipment, except for hauling on existing roadways, and removal of buildings by hand in sensitive areas. In addition, all areas where there has been ground disturbance would be seeded and planted with native species following project completion. Therefore, the adverse effects on soils due to construction activities would be temporary, but the long- term result of restoring native vegetation would provide moderate benefits to soils.

Although impervious surfaces would be removed in some areas under this alternative, in other areas, impervious surfaces would be added by the construction of roads and paths. A large area of impervious surfaces (2.04 acres; see Table 4- 3) would be eliminated when 61 buildings are removed. Subsequently, rates of runoff and soil erosion would decrease in those areas, providing indirect, long- term, moderate benefits to soils and adjacent waterways. Once vegetation is reestablished in areas formerly occupied by buildings, the plants would supply additional protection from erosion by absorbing rainfall impact on bare soils and by stabilizing soils with their root systems. The beneficial effects provided

by the plants would increase as the vegetation becomes more established and expands in area.

Additional activities required under Alternative B include paving of four parking areas with pervious pavement, installation of new water and sewer lines, underground utility lines, road repairs, and road and path construction. All of these activities would cause additional ground disturbance and result in short- term, minor, adverse effects to soils over a wider area in the District than in the No Action Alternative. In the long term, since the number of visitors is not expected to change and the estimated increase in internal pedestrian trips is minimal (see Table 4- 7), the soil compaction and related adverse impacts to plants from trampling would likely be negligible.

Although some infiltration is possible where pervious concrete is used (as proposed for parking lots), the surface is only able to absorb the first one inch of precipitation and would produce higher rates of runoff than undisturbed, vegetated surfaces. However, runoff is only expected to increase over the No Action Alternative by approximately 0.8 percent and the use of pervious pavement would provide indirect, long- term moderate benefits to a variety of resources by eliminating chronic erosion originating from unpaved areas currently utilized for parking.

In Society Hill, Alternative B restricts vehicular access along Jakes Creek Road south of Daisy Town by relocating a gate. This provision would provide long- term, minor benefits to Society Hill by eliminating the source of chronic soil disturbance, soil compaction and release of contaminants from automobiles.

4.4.2.2 Biotic Communities

4.4.2.2.1 Terrestrial Plant Communities

Direct, adverse effects to biotic communities would result during construction as a result of disturbance of vegetation communities by construction equipment. These effects would be negligible and short- term. However, wildlife in the District may indirectly experience long- term, major benefits resulting from an increased area and improved quality of habitat for both wildlife and the globally imperiled montane alluvial forest.

As described in the No Action Alternative, removal of the historic buildings would allow a variety of plant community types to increase. In the Wonderland Club, these communities include Appalachian montane oak- hickory forest and eastern white pine successional forest dominated by eastern hemlock. In Millionaire's Row, the floodplain of Bearwallow Creek contains early successional Appalachian hardwood forest dominated by tulip poplar, Appalachian montane oak- hickory forest and southern Appalachian cove forest. The occurrence of large sycamore trees in portions of the Little River and tributary floodplains indicates that these floodplain areas contain the heavily impacted montane alluvial forest, a community that is globally imperiled. Tributaries upslope of the Little River floodplain may contain many of the same overstory species and may be classified as the same community type, but they typically lack the biological and structural diversity of the floodplain forest located within the floodplain of larger rivers and streams. Removal of buildings

throughout floodplain areas and cessation of chronic disturbance would allow for gradual succession back to this forest type.

In Society Hill, forested areas have been considerably disturbed by past human activity. Plant communities present include early successional Appalachian hardwood forest, dominated by tulip tree and red maple, with smaller areas of Appalachian montane oak- hickory, southern Appalachian cove, and Virginia pine successional forest communities. The majority of the Daisy Town buildings are proposed to be retained under Alternative B, which eliminates the potential for expansion of plant communities on those sites. Chronic disturbance would continue in this area of the District, resulting from pedestrian traffic and vegetation management.

Retention of buildings in Daisy Town would require hazard tree removal beyond that which is performed adjacent to trails and within the Elkmont Campground. For historic buildings and grounds which have public access, the Park typically intensely manages the surrounding landscape and, although efforts would be made to retain as much of the forest communities as possible at Elkmont, the initial effort to remove hazard trees around retained structures would be aggressive. Annual maintenance of the perimeter around historic structures would continue to be intensive, thus truncating the age/size distribution by removing hazard trees that are often old or large and subsequently, adversely affecting the old growth stage of development. Implementation of Alternative B would increase the need for hazard tree management above that which is currently performed throughout the District and would adversely affect plant communities primarily throughout Daisy Town. These indirect effects are expected to be minor, but increase incrementally as more buildings are retained because additional hazard tree management would be required. In the remainder of the District, removal of the buildings would eventually allow forests to reach the old growth stage of development.

Within the study area, the globally imperiled montane alluvial forest would have an opportunity to expand up to 22 acres (9 hectares) throughout floodplain and wetland areas (see Table 4- 3) once the buildings are removed and hazard tree management is no longer necessary in these areas. Because no work is proposed in floodplains or wetlands under Alternative B, the potential for reestablishment of the montane alluvial forest is the same as that which would occur under the No Action Alternative.

4.4.2.2.2 Aquatic Communities

Direct, short- term, negligible, adverse effects to aquatic communities could result during implementation of Alternative B. These effects would occur during project implementation, primarily due to the ground disturbance, potential erosion, and runoff into surface waters that could occur following the use of heavy equipment. Protocols for project operations and impact avoidance measures have been developed by the Park to minimize the potential for adverse effects to biotic communities (see Section 2.2.1). Even with incorporation of these measures, due to the nature of the work, unavoidable, yet negligible discharges of sediment into aquatic environments could occur.

The overall indirect effect to aquatic resources in the District would be minor, long- term, and beneficial, resulting from an increase in the vegetation in abutting plant communities due to increased infiltration and associated decreases in runoff and soil erosion. Once vegetation is restored in areas formerly occupied by buildings, the plants would provide protection from erosion by preventing rain from falling directly on bare soils and by stabilizing soils with their root systems.

4.4.2.3 Threatened, Endangered, Rare and Sensitive Species

Like the No Action Alternative, Alternative B would not directly affect federal- listed endangered or threatened species since none are known to occur within or adjacent to the project implementation area. However, removal of the buildings and restoration of disturbed areas would indirectly provide long- term, minor benefits by eventually expanding and improving wildlife habitat. A state threatened species, butternut, and two State Special Concern species, Fraser's sedge (*Cymophyllus fraserianus*) and chamomile grapefern (*Botrychium matricariifolium*) occur within the District. Implementation of Alternative B would create the potential for existing populations of these species to expand into revegetated areas, with the exception of the Daisy Town area in which buildings are proposed to be retained. Similar benefits would also be provided to state-listed species for which the District contains potential habitat. Those species include running bittercress, rough hawkweed, Fraser's yellow loosestrife, broadleaf bunchflower, yellow nodding lady's tresses, peregrine falcon, common raven, North American river otter, longhead darter, and northern pine snake. Site- specific surveys would be conducted before implementing specific actions to determine if special status species existed in the project area. If any were located, the Park would consult with the U.S. Fish and Wildlife Service and the state of Tennessee to determine measures to avoid, minimize, or mitigate adverse effects on the species.

The hellbender (*Cryptobranchus alleghaniensis alleghaniensis*), is a large aquatic salamander with a state designation of "deemed in need of management" (similar to State Special Concern status for plant species). This salamander is not known to occur at Elkmont, but a population does exist within the Little River, downstream from "The Sinks", a natural waterfall located within the Park. As a result, any actions in the District that could impact habitat downstream or water quality within the Little River could indirectly affect the hellbender. Short- term, adverse effects to water quality during construction are expected to be negligible. Following project implementation, expansion of the available area for infiltration should provide minor benefits to water quality, indirectly benefiting aquatic species downstream such as the hellbender.

Although it is not a federally or state- listed species, the synchronous firefly that has been observed in the District would likely benefit in the short- term from expanded habitat as well. Alternative B proposes removal of buildings that could increase moist, grassy areas where synchronous fireflies are often found. However, over the long term, without management to sustain those herbaceous habitats, woody vegetation would eventually encroach upon the area, possibly affecting the synchronism of this species. At this time, the role of synchrony in the ecology of this species is poorly understood, so this impact is difficult to quantify.

4.4.2.4 Wetlands

Short- term, direct, minor adverse effects to wetlands would occur during project implementation as a result of disturbance created by heavy equipment in wetlands within Millionaire's Row. Although protocols have been established to avoid the potential for impacts to sensitive areas, the environment of the wetlands along Bearwallow Branch is not suitable for machine traffic or even heavy pedestrian traffic due to saturated soil conditions. Although these wetlands would be disturbed during project implementation, this disturbance would be temporary and further minimized through seeding of native species over disturbed soils. However, wetlands may be indirectly benefited by the removal of adjacent buildings, such as those found in Millionaire's Row.

The environment surrounding residential buildings is subject to runoff from impervious surfaces, soil compaction, deposition of petrochemicals, effects of planting of non-native species (by prior residents of the District), and vegetation management. These types of chronic disturbances tend to result in loss of native plant diversity and subsequent degradation of wildlife habitat. Wetlands that abut residential properties would benefit from elimination of these chronic disturbances. These effects would be long- term, but minor.

Implementing Alternative B would benefit wetlands by increasing several wetland functions and values, including wildlife habitat, aesthetic/visual quality, flood storage, water quality, fish/shellfish habitat and recreation. Improving wildlife habitat in areas adjacent to wetlands would enhance the wildlife habitat function by providing additional upland habitat and by increasing botanical diversity. Wildlife species that migrate into areas formerly occupied by buildings would utilize wetland habitat nearby as well. The aesthetic/visual quality value of the wetland would be improved by planting those sites with native plant species. Removal of impervious surfaces would allow greater infiltration adjacent to the wetlands. Both the water quality and subsequently, the fish and shellfish habitat functions would improve due to the increased area available for infiltration and reduction in the area of impervious surfaces. In addition, repair of culverts to correct erosion problems would provide indirect benefits by ensuring that additional erosion and sediment- laden water does not make its way into abutting wetlands or floodplains. As described in the No Action Alternative, the recreational value of the wetlands potentially would also increase because removal of the buildings would provide more opportunities for recreation, such as wildlife watching, wildflower identification, fishing, hiking, and a variety of activities focused on observation and appreciation of biotic communities.

4.4.2.5 Water Quality

Water quality can be affected by a variety of activities resulting in discharge to surface waters both during and following project implementation. Alternative B would result in changes to surface water runoff rates and volumes, and would require additional discharge of treated effluent into the Little River. Both of these activities would have negligible effects on water quality. Potential impacts to water quality resulting from implementation of Alternative B are described below.

The adverse effects on water quality resulting during project implementation are expected to be short- term and negligible, primarily caused by disturbance created by heavy equipment used to remove buildings and to transport materials into areas in which

restoration, rehabilitation and preservation are proposed. Although Best Management Practices would be followed, there would still be potential for erosion in disturbance areas and sedimentation into water bodies to occur during project implementation. However, once the areas are planted and vegetation becomes established, a large area (2.04 acres) of impervious surfaces would be eliminated, reducing runoff that could contaminate District waterways and providing long- term, minor benefits to water quality.

All of the proposed infrastructure components (water lines, sewer lines, electrical service, parking areas) associated with this and other alternatives would be placed to minimize the potential for soil erosion and sediment transport to surface waters within the District. Where possible, to minimize potential impacts, pipelines have been planned to be suspended under bridges to cross streams, rather than be placed under the streambed. Where lines cannot be hung from bridges, they would be bored under the streambed, avoiding the potential for disturbance to the stream substrate and potential impacts to water quality.

The need for additional parking areas varies in each alternative with the initial consideration being the expansion, reconfiguration and resurfacing of existing parking areas, where possible, and then constructing new parking areas where beneficial and/or necessary. Areas currently used for parking are not paved and vehicular traffic has resulted in loss of vegetation, soil compaction and erosion. Projected annual rainfall runoff from pavement is shown in Table 4- 5. A very small (0.8 percent) increase in runoff over the existing condition is expected to occur as a result of implementing Alternative B. This small quantity would have no effect on water quality.

Sewage Treatment and Pollutant Discharge

No change in water quality would result from sewage treatment and pollutant discharge following implementation of Alternative B. As shown in Tables 4- 10 and 4- 11, the total amount of discharge pollutants remain at baseline levels under Alternative B. There are not any baseline conditions established for thermal loading, other than typical wastewater temperatures of 60° Fahrenheit (see Section 2.2.1). However, the incremental increase in effluent discharge in this alternative would be such that temperature effects are negligible (McGill Associates 2004). The effluent discharge rate would remain the same as the existing condition under all alternatives. At the current rate of discharge, thermal impacts are dissipated entirely within three feet of the discharge pipe due to effluent mixing with cooler water in the pipe from the plant to the discharge point. Because the cooling would continue and the rate of discharge would remain the same under all alternatives, there would be no thermal impacts to the Little River as a result of implementing this alternative (McGill Associates 2004).

In addition, the sewer line under Jakes Creek to serve the Appalachian Clubhouse would be located above the Little River's confluence with Jakes Creek. The line would be placed in this location to minimize any in- stream impacts to both Jakes Creek and the Little River. Since the Appalachian Club interior would be rehabilitated for day use, public restroom facilities would be required. The additional wastewater associated with this action that would require treatment is estimated at 1,300 gallons per day. This additional wastewater discharge is minor and can be adequately treated within permitted limits and without any improvements to the existing treatment plant. Water quality

standards for Outstanding National Resource Waters would continue to be met because concentrations of contaminants would remain below the water supply maximum contaminant level (See Table 4- 12). Therefore, rehabilitation and reuse of the Appalachian Clubhouse would have no effect on water quality.

4.4.2.6 Floodplains

There would be no direct effects to the 100- year floodplain of the Little River or its tributaries as a result of implementing Alternative B. Long- term, indirect, moderate beneficial effects to these floodplains would be experienced through removal of buildings currently in and adjacent to the 100- year floodplain of Bearwallow Branch and the Little River. An increase in the area (3,520 sf) available for infiltration and flood storage would be a direct benefit due to removal of three buildings in the 100- year floodplain (Miller (#46), Faust (#47), and Faust garage (#47A)) and their associated impervious surfaces. Another direct benefit would be an increase in the area for establishment of associated plant communities, such as the montane alluvial forest, that could regenerate at former building sites. Restricting vehicular access and removing buildings in areas adjacent to floodplains would provide indirect benefits by increasing the area available for infiltration, thereby reducing the demand for flood storage within the floodplains. Additional permanent, moderate indirect benefits would be achieved because removal of buildings within and adjacent to floodplains would eliminate future ground disturbance and soil compaction associated with residential use.

4.4.2.7 Air Quality

Air quality can be affected by increases in vehicular traffic and by how this traffic moves throughout the District. Increased engine idling times will generally occur as traffic congestion causes increases in travel time along roadways, within parking areas, at gates, and at destination points that are visible from the roadway, such as at wayside exhibits. Longer idling times result in increased emissions.

As in the No Action Alternative, projected visitation to the District is not expected to change following implementation of Alternative B. However, there would be a temporary increase in emissions due to operation of equipment during project implementation. Therefore, direct adverse effects to air quality would be short- term in duration and negligible, occurring only during construction. These effects could be minimized by reducing equipment idling times, ensuring that all equipment is in good operating condition, and by performing construction during the time of year when ozone is least likely to form (April to September).

Once construction is complete, internal trips within the District are expected to increase and the specifics of this alternative that could affect the quantity of emissions discharged into the District include construction of parking lots in the Appalachian and Wonderland Clubs. An analysis was performed by the Park to evaluate the potential nitrogen deposition and nitrogen dioxide (NO_2) impacts from the use of the proposed Appalachian Club and Wonderland Club parking lots. The EPA CALPUFF model was run in the screening mode for 5 years with National Weather Service data from Knoxville, Tennessee. As a worst case, screening analysis emissions from both parking lots were combined. A range of vehicle emissions from the parking lots reflecting both a high use and a moderate use scenario were modeled. The high use scenario assumes eight tons per year of nitrogen oxide (NO_x) vehicle emissions and the moderate use

scenario assumed 4 tons per year of NOx vehicle emissions. Two different season lengths were analyzed. One season length assumes year around use and the other season assumed nine months of use with the parking lots shut down during November, December and January. Emissions were pro- rated by hours of the day with no emissions assumed from midnight to 6:00 am. Nitrogen deposition was calculated for the distances of 9 mile and 11 miles to reflect the distances to Clingmans Dome and Noland Divide, respectively. The analyses show impacts very far below the nitrogen deposition threshold of 0.01 kilograms per hectare per year. The impacts were in the range of one- ten thousandth of the nitrogen deposition threshold. The visible haze analysis indicates no visible haze impacts. The maximum impact of nitrogen dioxide to the annual NO2 Class I Prevention of Significant Deterioration (PSD) increment was approximately 0.017 micrograms per cubic meter (ug/m^3), or one- sixth of the EPA Class I significance level (0.1 ug/m^3). A visible plume analysis using the EPA VISCREEN model in the Level 1 mode also indicated that there will not be a visible plume impact from the vehicle emissions.

In an independent air quality assessment performed by McGill Associates based on a busy Saturday in summer, the emissions of two key air pollutants resulting from the condition created by Alternative B in 2015 are projected to be 50.37 tons per year of NOx and 72.64 tons per year of VOCs (see Table 4- 8). These figures represent no change from the existing condition. As a result, no indirect effects to air quality are anticipated as a result of implementing Alternative B.

4.4.3 Impacts on Interpretation and Visitor Use

Implementation of Alternative B requires removal of most of the historic buildings in the District. Removal of the buildings is not expected to change the number of visitors to the area, although there would be a moderate increase in the number of visitor trips to interpretive exhibits. Interpretive programs include illustrated talks as well as guided hikes that cover a wide range of topics such as art, music, history, Native American culture and natural history. The Elkmont Nature Trail brochure would be revised to include historical information about Elkmont, the Appalachian Clubhouse would be restored for public day use rental, some of the cabins in Daisy Town would be restored on the exterior for use as interpretive exhibits and additional exhibits would be installed throughout the District.

4.4.3.1 Visitor Experience

Visitor experience is expected to change considerably as a result of implementing Alternative B. Although removal of most of the buildings and restoration and preservation of others is not expected to significantly change visitor use, there would be an increase in the level of interpretive efforts. Providing additional historical information in the Elkmont Nature Trail brochure, an orientation kiosk with exhibits, up to eight wayside exhibits throughout the District, and a set of interior exhibits at the Appalachian Clubhouse would indirectly have a long- term, moderate, beneficial effect on visitor experience in the District. The visiting public would have the opportunity to learn about the establishment and history of Elkmont, and the cultural and natural resources of the District.

Alternative B would provide indirect, major, permanent, effects to the visitor experience by removing some of the buildings from the landscape. These effects would be adverse

due to removal of buildings in the Wonderland Club, Millionaire's Row and most of Society Hill and beneficial due to the retention and restoration and preservation of cabins in Daisy Town. However, in contrast to the previous alternatives, wayside exhibits, interior exhibits, and updating of the trail brochure in Alternative B would provide visitors with an understanding of what they are viewing in the District and to have a sense of time and place associated with the buildings.

Currently, the buildings and adjacent grounds are closed to the public and the present condition of the District allows for multiple opportunities to view the intact cultural landscapes, including the buildings and smaller- scale features, from existing roadways. Thus, the focus on the portion of the District that contains buildings is on investigation and discovery of cultural resources within their setting. If Alternative B were implemented, visitor experience would change to one focused primarily on natural resources with cultural interpretation opportunities available at wayside exhibits, at cabins retained in Daisy Town, through use of the Appalachian Clubhouse, and through retention of cultural landscape elements. The remainder of the District would be restored to native plant communities.

4.4.3.2 Visitor Facilities

Visitor facilities would experience long- term, moderate, direct and indirect benefits as a result of implementing Alternative B. Although most of the historic buildings would be removed under this alternative, a variety of visitor facilities would be added. A total of eight wayside exhibits, an orientation kiosk with self- guiding tour booklet, and an update to the Elkmont Nature Trail brochure would be added under Alternative B. Additional exhibits installed inside the Appalachian Clubhouse would provide historical information and pictures. These exhibits would serve as a self- guiding museum and the Clubhouse would be available for public rental as a day use facility. The interpretive features would provide visitors with information on the natural and cultural resources. With the addition of the exhibits, visitors would gain the ability to understand the history behind establishment of the Town of Elkmont, the history of the Appalachian and Wonderland Clubs and train stations, and to learn about the establishment of Great Smoky Mountains National Park and the relationship of Elkmont to the Park. Exhibits describing the natural and cultural history of the area would be placed strategically to orient visitors as they enter the District and at most of the major sections of the District, including the campground.

Other long- term minor benefits to visitor facilities provided by Alternative B include construction or repaving of four parking areas in the District, repaving or widening several roads, construction of asphalt walking paths and restoration of the Appalachian Club, including restroom facilities, for day use. Some of the areas in which visitors currently park are not paved and are eroded, rutted and generally disturbed. Creation of pervious pavement lots would provide a stable surface for parking while preserving the aesthetic quality of the environment expected by the visiting public in a National Park. In addition, day use and restroom facilities would be provided at the Appalachian Clubhouse. These facilities would be accessible to the visiting public and would help to decrease the demand on campground facilities reducing the need for visitors to drive into the campground to access restrooms, eliminating some of the potential disturbance to campers.

4.4.4 Impacts on Socioeconomic Environment

Alternative B would have no direct, indirect or cumulative effect on the socioeconomic environment.

4.4.4.1 Population and Environment

Alternative B would have no direct, indirect or cumulative effects on local or regional populations.

4.4.4.2 Land Use

Implementation of Alternative B would indirectly result in long- term, moderate beneficial effects to land use. These effects would be achieved through opening the grounds to the public following removal of some of the buildings and structures and by providing additional opportunities for those uses described in the land use zone designations in the 1982 General Management Plan. Implementation of Alternative B would continue to allow for use of public roadway corridors, accommodations at the existing quarters, and picnicking and camping at the Elkmont Campground. Historical and natural resource interpretation would be increased over that which is currently offered (through NPS programs and printed material) through installation of a variety of exhibits, retention of some buildings for interpretive uses, and the Appalachian Clubhouse as a public day use rental facility and self- guiding museum. These uses would be supported by alterations to existing infrastructure including new parking areas and restroom facilities. Internal trips within the District are expected to increase slightly as a result of implementing Alternative B (Table 4- 7); however, overall visitation to the District is not expected to increase relative to the No Action Alternative. Therefore, increased visitor opportunities within the District are not expected to result in land use conflicts (such as traffic congestion, crowding, etc.) if Alternative B is implemented.

4.4.4.3 Access and Circulation

During implementation, Alternative B would create negligible, short- term, adverse effects on access and circulation. Although the buildings and grounds would remain closed during construction to prevent safety hazards to visitors, alternate access to trails in the area may need to be provided. To avoid impacting campground visitors, construction activities would take place when the campground is closed (December to February). These measures would greatly reduce the potential for adverse effects to access and circulation. During removal of the buildings, construction vehicles would add to visitor traffic to and from the District and might cause minor delays due to the reduced capacity for trucks carrying heavy loads to accelerate.

Once implemented, Alternative B proposes a low intensity of reuse for the District including exterior restoration of cabins in one area for use as interpretive exhibits. Because the proposed redevelopment is minimal and visitation to the District is not expected to change, this alternative is not likely to affect access and circulation. However, an increase in total daily trips is expected to occur under this alternative, from 1,340 in the No Action Alternative to 2,030. Internal pedestrian trips would increase from 431 to 435. A complete comparison of estimated change in volume of trips between alternatives is provided in Tables 4- 6 and 4- 7 at the end of this chapter. A number of roadway modifications have been proposed to alleviate potential internal traffic conflicts as visitors travel between exhibits and other areas of the District. The potential for pedestrian and vehicle conflicts would be minimized through resurfacing of an

overgrown path in Daisy Town to separate visitors viewing the restored cabins from vehicular traffic on Daisy Town Loop Road. The existing gate on Jakes Creek Road would be relocated to just south of the road to Jakes Creek Cemetery to prevent vehicular traffic from traveling farther up Jakes Creek Road. Although the potential for vehicle and pedestrian conflicts would still exist, these proposed modifications would provide a long- term, moderate beneficial effect by providing additional safety measures for visitors. Following project implementation, the level of service is not expected to change along District roadways, resulting in no change in average travel speed, percentage of time spent following or headway between vehicles.

4.4.5 Impacts on Other Resources

4.4.5.1 Viewshed

Impacts to visual quality consist of changes that would alter or obstruct (1) visible landscape features from dominant viewpoints established as part of this analysis; and (2) access and visibility to dominant or important viewpoints or sequences of viewpoints. The primary viewpoints or sequences of viewpoints within the District are from existing roadways and trails. Currently, the building grounds are closed to the public and access to many of the viewpoints within the District is prohibited due to safety concerns related to the condition of the buildings.

The established baseline for this environmental analysis and the associated visual analysis is the No Action Alternative. This baseline identifies a naturally regenerated landscape within the study area as the condition for the visual analysis. The buildings within the study area are considered obstructions to the natural viewshed that would be removed if the General Management Plan (the No Action Alternative) was implemented. In addition to retention of some buildings, Alternative B proposes to retain foundations, rock walls and other cultural landscape components. .As a result, long- term, indirect, minor, adverse effects would be created by retention of most of the Daisy Town buildings, the Appalachian Clubhouse, and some cultural landscape components. Although retention of these buildings and cultural landscape components would adversely affect visual quality by obstructing the natural viewshed, some long- term, minor benefits to visual quality and aesthetics would be realized through removal of the remainder of the buildings in the District and increasing the area available for restoration of native plant communities (photos 3 through 6A in Appendix D depict the existing views of a variety of historic buildings and simulations of the potential views following removal of these buildings). Direct, adverse impacts to the District viewshed are expected to occur during implementation of Alternative B because of the presence of machinery and ground disturbance but these effects would be short- term and negligible.

The viewshed sensitivity maps shown in the Visual Quality Assessment (Appendix D) indicate the areas visible from a variety of viewpoints throughout the District. The direct effect on the composite viewshed would also be long- term, minor, and adverse under Alternative B due to retention of some buildings, structures and cultural landscape components. Composite viewshed areas shown (Figures 7, 8 and 9, Appendix D) would also be adversely impacted by building retention with regard to the area that is visible from the transportation corridors.

4.4.5.2 Soundscape

Direct, short- term, minor adverse effects on the soundscape are expected to occur during implementation of Alternative B due to construction activities. High noise levels of combustion- powered equipment, particularly due to earth moving equipment (usually diesel), are expected to be the primary contributor to the sound levels during construction and can interfere with the ability of individuals near the work site and passersby to hear speech. Peak noise levels from construction as measured at a distance of 50 feet may vary from 70 dBA to 100 dBA. The major sources of construction noise in this alternative may include removal of buildings, hauling, grading, and paving. Overall, construction noise would be relatively short in duration and restricted to daytime hours at the time of year in which visitation is expected to be the lowest.

Following construction activities associated with project implementation, it is expected that future noise levels under Alternative B would likely be in the range of 50 to 60 dBA (see Table 4- 9). As in the No Action Alternative, since these noise levels do not exceed the noise abatement criteria 67 dBA, Alternative B would have no long- term effect on noise levels in the District.

4.4.6 Impacts on NPS Operations

In addition to removal of historic buildings, Alternative B includes modifications to existing infrastructure, increasing the number of parking lots and paving with pervious pavement, restoration of cabins for use as interpretive exhibits and restoration and rehabilitation of the Appalachian Club for day use. All of the new visitor facilities, exhibits and infrastructure would have to be maintained by NPS staff. However, the effect of implementing Alternative B on NPS operations would be permanent, moderate and beneficial, primarily because the need to stabilize, maintain and police buildings across the District would be largely eliminated, with the exception of the 12 cabins retained in Daisy Town and the Appalachian Clubhouse. Therefore, although there are costs associated with restoring and preserving the 13 buildings and for maintaining the upgraded infrastructure (i.e. cleaning pervious pavement, maintaining exhibits, etc.), this cost would be greatly reduced over the existing condition. The cost would also be offset by revenue generated from rental of the Appalachian Clubhouse as a day use facility.

Indirect beneficial effects on NPS operations would also result due to removal of the Elkmont buildings. The buildings have the potential to contain hanta virus, a disease spread by rodents, and histoplasmosis, which is spread by bats. Both of these contagions can be fatal to humans who come into contact with them. Some of the buildings contain a variety of debris, ranging from broken glass and fallen plasterboard to lead- based paint. Removal of hazards that pose a danger to the visiting public would remove the potential for harm, reduce the need for NPS law enforcement in the District, and ultimately provide permanent, moderate benefits to NPS operations.

In moist cove forest communities, such as those found in the District, research has shown that between one and one and one- half percent of canopy trees fail on an annual basis (Runkle 1982). Therefore, the NPS currently manages vegetation adjacent to the buildings and removes hazard trees where necessary. Some of these trees have fallen on buildings in the past, requiring removal of the downed tree and repair of damage to the building(s). Some of the expenditures required for vegetation management adjacent to the buildings would be eliminated as buildings are removed, indirectly benefiting NPS

operations through a reduction in costs associated with staff time and equipment needs. However, the overall indirect effect on NPS operations due to hazard tree and other vegetation management is expected to be minor, long- term and adverse because additional areas of the District and the grounds besides the area that is currently open to the public would be opened and would require aggressive vegetation management. Because the grounds would be opened to the public, even where buildings are removed the NPS must manage vegetation to provide for visitor safety. Hazard trees adjacent to exhibits, trails and roadways would continue to be removed as needed to reduce the possibility that visitors could be harmed by falling trees.

4.4.7 Cumulative Effects

Like the No Action Alternative, cumulative effects would include long- term, major benefits created by removal of buildings and subsequent revegetation throughout the District under Alternative B. Reestablishment of native plant communities provides multiple benefits to the aquatic and terrestrial environment through soil stabilization and reduction in erosion and sedimentation. Although water quality in the Little River and its tributaries has remained excellent, contributions of sediments from erosion or petrochemicals from parking area runoff can add to the existing load already entering the river system from the high number of visitors to the Park and surrounding gateway communities. Reduction in runoff and elimination of erosion help to lower the potential for contaminants to enter the river. At the same time, restoration of native plant communities not only increases total vegetation cover, but also increases the area of available habitat for a variety of fauna and the potential for reestablishment of the globally imperiled montane alluvial forest.

Invasive, non- native plant species thrive in disturbance areas. The spread of these species could be further exacerbated by increased disturbance caused by pedestrian traffic into sensitive areas. Permanent revegetation with native species would create a beneficial cumulative effect by reducing the area available for invasive, non- native species to become established, thereby decreasing the potential for these species to infiltrate into surrounding areas of the Park. Failing to continue a comprehensive, invasive, non- native species management program at Elkmont Historic District could, over time, result in the spread of those species into other areas of the Park adding exponentially to the existing adverse effects that these invasive species have on the Park's botanical diversity.

The loss of aboveground cultural resources in Alternative B is significant and would result in a permanent, adverse, cumulative effect. While the Park contains a variety of historic buildings and cultural landscape components, the District represents the only remaining community of this type and time period in the Park. Other resort properties representing this time period, such as hotels and lodges inside the Park, and hotel and cabin communities outside the Park, have either been removed or may no longer retain historic integrity. When added to past actions, implementation of this alternative would cumulatively result in loss of groupings of buildings representing this period in southern Appalachian history

4.4.8 Conclusion

Like the No Action Alternative, implementation of Alternative B would result in maintenance and / or enhancement of the long- term productivity of many of the natural

resources, including soils, floodplains, aquatic and terrestrial communities, wetland functional values, habitat for threatened, endangered, rare and sensitive species, and water quality. In general, the overall long- term productivity of all biotic resources would be benefited due to the increase in land available for restoration of native plant communities. Removal of buildings and structures throughout the District would increase the area available for reestablishment of the globally imperiled montane alluvial forest. In addition, restored vegetation within and adjacent to floodplains, wetlands and tributaries would further protect water quality of the Little River, an Outstanding National Resource Water. Removal of most of the buildings would benefit NPS operations by eliminating the need for resources to maintain and stabilize them. Long-term, minor adverse effects to NPS operations would be created due to the additional vegetation management required adjacent to the buildings retained. However, retention of some buildings and opening the District grounds following project implementation would indirectly provide long- term benefits to land use and interpretation, allowing for increased opportunities for visitors to view interpretive displays with information on the cultural and natural resources of the District. Some of the costs associated with implementing Alternative B would be offset by the revenue realized from rental of the Appalachian Clubhouse as a day use facility.

However, irreversible and irretrievable commitments of resources would be required for implementation of Alternative B. These commitments would result primarily from removal of most of the historic buildings within the District. Direct, permanent, major, adverse effects to aboveground cultural resources would occur due to removal of many of the historic buildings and loss of landscape characteristics and features (mainly "spatial organization" and "buildings and structures"; see Table 3- 3). In addition, this alternative would result in a change in the use and setting of the cultural landscape. Indirect, minor, adverse effects on the District and its landscape would include wear and tear on features in the Appalachian Clubhouse and other interpretive features in Daisy Town due to increased internal trips to view exhibits. There is also potential for irreversible impacts to archeological resources as a result of implementation of this alternative, but it is possible that those effects could be eliminated or minimized through proper planning and avoidance measures.

Unavoidable adverse impacts associated with implementing Alternative B are primarily direct, short- term, and negligible and would affect soils, biotic communities, noise, air quality, visitor experience, visitor use, access and circulation, and aesthetics and viewsheds. These effects would be caused primarily by ground disturbance during installation of water lines, sewer lines, and parking areas; increased erosion potential; increases in noise and emissions from construction equipment; and the short- term adverse effects on visual quality and aesthetics during and immediately following construction, prior to reestablishment of vegetation in disturbed areas. Visual quality and aesthetics would experience minor, adverse impacts due to retention of buildings and some cultural landscape components that currently degrade views of the natural environment.

4.5 Impacts of Alternative C, the Preferred Alternative

Alternative C entails the retention of 16 cabins and the Appalachian Clubhouse in Daisy Town, the retention of the Chapman cabin (#38) in Society Hill, and removal of all other historic buildings in the District, either by mechanical means or by hand. Visitation to the District following implementation of Alternative C is not expected to change considerably; however, traffic within the District is expected to increase slightly (Table 4- 6). Existing recreational use would continue to occur. New exhibits are proposed under this alternative and the Elkmont Nature Trail brochure would be updated to include natural and cultural resource information on Elkmont. The Park would continue to implement its existing natural resource management activities.

Some changes to parking and circulation within the District would be required. Once the project related work was completed, a minor increase in operation and maintenance expenditures would be required beyond what the Park already budgets for the roads, parking, water and wastewater systems, and operations and staffing.

4.5.1 Impacts on Cultural Resources

Buildings and Cultural Landscape

Implementation of Alternative C would constitute an adverse effect on the Elkmont Historic District, entered in the National Register of Historic Places (NRHP) on March 22, 1994. Alternative C would remove 32 buildings listed as contributing in the NRHP nomination, including the remains of the Wonderland Hotel, the Wonderland Hotel Annex, 27 cabins and 3 garages. The alternative would retain 17 contributing buildings, including the Appalachian Clubhouse and 16 cabins. Also as part of Alternative C, one additional non- contributing cabin would be retained, resulting in a total of 18 buildings retained under Alternative C. The majority of Elkmont's cultural landscape elements and features also would be retained under this alternative.

Of the 32 contributing buildings proposed for removal, 25 buildings were listed as either "Poor" or "Fair to Poor" condition in 2003. Of these same 32, two—the Wonderland Hotel and Cabin #36 —have significant portions that have collapsed and at least four other cabins have significant problems with structural integrity. Because Alternative C proposes the removal of approximately 60 percent of the contributing buildings within the historic district, implementation of the alternative would compromise the overall layout and spatial patterns among the component resources of the historic district, and its integrity would be lost.

Based on consultation with NRHP staff, it has been determined that, following implementation of this alternative, the buildings and landscape features retained at the Appalachian Club (Daisy Town) will constitute a small historic district that is eligible for the NRHP. The name, boundary, and contributing features of this historic district will not be the same as the existing Elkmont Historic District. After Alternative C is implemented, the Park will prepare an amendment to the documentation for the Elkmont Historic District. This additional documentation will accurately reflect the appearance and characteristics of the resources retained within Elkmont. As part of this National Register amendment process, the Park is committed to providing additional documentation along with inclusion of the cultural landscape and significant associated features and elements not included in the original nomination. One purpose of the

amended nomination is to accurately describe the overall significance and integrity of the District, based on the extant resources following implementation of Alternative C.

While the overall effect on the Historic District would be adverse, because Alternative C incorporates the continued use of 18 historic buildings into ongoing Park operations, the long- term preservation of these resources would be guaranteed and would be considered a beneficial effect. This alternative is realistic from a long- term management standpoint and achieves preservation of the core collection of historic resources at the Appalachian Club. This particular area evokes the strongest sense of community within Elkmont and offers the greatest opportunity for visitors to understand the former vacation community and the broad cultural pattern of second- home vacation cabins from the early 20th century. Daisy Town also offers the best cross section of Elkmont's various construction techniques and building materials, as well as preserving the only "set- off" cabins in the Park. The Appalachian Clubhouse would be rehabilitated as a day- use rental for the public. Sixteen historic Daisy Town cabins, the cabin associated with Colonel Chapman located along Jakes Creek in Society Hill, and the historic swimming hole at Little River would be preserved.

The cultural landscape characteristics and features of Elkmont, such as the historic swimming hole at Little River, stone walls and a footbridge over Bearwallow Branch, would be retained under this alternative as would other eligible cultural landscape features. The preservation of the retained cabins and rehabilitation of the clubhouse would be conducted in accordance with *The Secretary of the Interior's Treatment Standards*.

Where adequate documentation is available, all modern, exterior changes made to cabins that post- date 1940, will be restored to a point within the listed period of significance. This includes, but is not limited to, elements such as porch decking, porch posts and rails, modern additions and modern substitutions of original materials.

The Swan cabin (#4), considered non- contributing because it has lost its integrity, will be restored to a point within the period of significance. Conspicuous modern additions will be removed from this building such as the deck, side and rear rooms. Based on available documentation, building features that have been altered, such as the porch, posts, railings and foundation piers, will be restored or recreated to a point within the period of significance. This building will be restored to maintain the spatial relationship of the established streetscape in Daisy Town.

This alternative would introduce new visual elements into the District, including eight wayside exhibits, an orientation kiosk, four parking areas, and paths leading from the parking areas to exhibits. Indirect adverse effects on cultural resources would be minor, but long- term. These indirect effects would be caused by a modest increase in the number of internal trips to the restored buildings, along with wear and tear from pedestrian traffic to the Appalachian Clubhouse and, potentially, on the porches of the retained Daisy Town cabins. Overall visitation and use specified for most buildings and features is primarily interpretive under Alternative C.

The interpretive exhibits, parking areas, new paths and roads, and stream bank stabilization at eroded culverts would create minor adverse effects on cultural resources.

The proposed new elements would constitute a minimal visual change. In addition, the proposed parking areas, paths, and roads would be located in areas already impacted by existing roads, parking areas and modern buildings slated for removal. The proposed utility lines would be buried in the ground, thereby removing visually intrusive power poles that postdate the period of significance.

Archeological Resources

As with all alternatives, the potential for Alternative C to impact archeological resources depends on the level, extent and location of ground- disturbing activities. The Park will implement strategies to avoid or minimize any impacts on archeological resources. Alternative C proposes removal of fewer buildings than the No Action Alternative. However, restoration, rehabilitation and preservation activities could result in ground disturbance in Daisy Town and adjacent to the Chapman (#38) cabin in Society Hill. Installation of new sewer, water and electrical lines to the Appalachian Club and construction of parking areas also would result in additional disturbance that could affect archeological resources. Any such impacts would be direct, long- term, and adverse, and could be major.

The areas where archeological resources could potentially be adversely affected include one locus where significant resources have been documented, six loci where potentially significant resources have been identified, and two areas that have not yet been surveyed. There would be no effect on potentially significant resources at 10 loci. Compared to the No Action Alternative, this alternative may impact two additional loci where potentially significant resources have been identified. Those resources could be adversely affected by installation of the Little River Trail parking area and by installation of a water line. The ultimate impacts to archeological resources due to project implementation would depend on the outcome of additional investigations. NPS staff would continue established resource protection measures for the identification and treatment of archeological resources on a case- by- case basis.

Section 106 Determinations

Under Section 106 of the National Historic Preservation Act, the removal of 32 contributing buildings within the NRHP- listed Elkmont Historic District would constitute an adverse effect. The overall integrity of the District would be lost as a result of implementing this alternative. The potential effects to archeological resources under Alternative C could result in a determination of adverse effect.

Proposed mitigation:

All mitigation will be determined through formal consultation with the Tennessee State Historic Preservation Office, the Advisory Council on Historic Preservation, and the Chickasaw Nation and Eastern Band of the Cherokee Indians Tribal Historic Preservation Officers, in accordance with the provisions of the National Historic Preservation Act and all other applicable Federal laws and regulations.

Great Smoky Mountains National Park intends to develop comprehensive, scholarly historic contexts for Elkmont, with input from professional scholar- advisors; conduct a comprehensive Cultural Landscape Inventory (CLI); and prepare revised National Register documentation based on the new historic contexts, the CLI, and other relevant research.

The revised National Register documentation will more accurately reflect the resources that will remain and will more fully explore and explain the contribution of the many landscape features to the historic scene at Elkmont. To prepare an amendment, a comprehensive evaluation of all significant contributing features, including buildings and landscape features, will be completed.

A mitigation measure that has been proposed as an option under Alternative C is the retention of Cabin 42, "River Lodge," known also in recent times as the Spence Cabin. Under this proposal, the cabin would be restored on the exterior to a point within the period of significance and rehabilitated on the interior as a day use facility. This cabin is a significant element within the district for its association with the former president of the Little River Lumber Company, Colonel Wilson B. Townsend. The retention of this cabin would bring the total number of buildings retained to 19. Cabin 42 is within an imperiled montane alluvial forest community that is globally significant. Impacts to this forest community from retention of this one building are expected to be minor and within acceptable limits of change.

4.5.2 Impacts on Natural Resources

Impacts to natural resources due to implementation of Alternative C would result primarily from ground- disturbing activities associated with building removal and infrastructure modifications. These effects are discussed below for each natural resource.

4.5.2.1 Soils

This alternative proposes removal of 56 buildings total in Elkmont Historic District. As a result, short- term, moderate adverse effects on soils would occur during project implementation if the use of heavy machinery and other demolition equipment is necessary for removal of the buildings. These effects would be mitigated by protocols established by the Park such as permitting only the use of low ground pressure equipment (except for hauling on existing roadways) and removal of buildings by hand in sensitive areas. In addition, all areas where there has been ground disturbance would be seeded with native species following project completion. Therefore, the adverse effects on soils due to demolition activities would be temporary.

Short- term, moderate, adverse effects to soils would occur as a result of installation of new water and sewer lines, underground utility lines, paths, and road repair and construction. All of these activities would require either excavation or grading, resulting in adverse effects to soils over a wider area in the District than in the No Action Alternative. In the long term, since the increase in internal pedestrian trips is likely to be minimal (see Table 4- 7), the soil compaction and related adverse impacts to plants from trampling would be negligible.

Overall, the indirect effect on soils over the long term would be adverse, but minor, resulting from some elimination and some addition of impervious surfaces. A large area of impervious surfaces (1.88 acres) would be eliminated when 56 buildings are removed. Subsequently, rates of runoff and soil erosion would decrease in those areas and long-term beneficial effects on soils and adjacent waterways would be provided. Once vegetation is reestablished in areas formerly occupied by buildings, the plants would

supply additional protection from erosion by preventing rain from falling directly on bare soils and by stabilizing soils with their root systems.

However, although impervious surfaces would be removed in some areas under this alternative, in other areas, impervious surfaces would be added by the paving of roads and parking areas. Although pervious concrete would be used in parking areas and some infiltration is possible where this material is used (see Section 4.5.2.5), the surface is only able to absorb the first one inch of precipitation and would produce higher rates of runoff than undisturbed, vegetated surfaces. Additional rain water cannot penetrate these surfaces and would runoff onto adjacent soils. The estimated increase in runoff over the existing condition is 0.8 percent (Table 4- 5). This would cause a small increase in soil erosion that could, in turn, result in increased sedimentation into area streams and degradation of water quality due to contamination of runoff with petrochemicals and other contaminants from automobiles. In Society Hill, Alternative C restricts vehicular access along Jakes Creek Road south of Daisy Town by relocating a gate. This provision would provide long- term, minor benefits to Society Hill by eliminating the source of chronic soil disturbance, soil compaction and release of contaminants from automobiles.

4.5.2.2 Biotic Communities

4.5.2.2.1 Terrestrial Plant Communities

Direct, adverse effects to biotic communities would occur during construction as a result of disturbance of vegetation communities by construction equipment. These effects would be negligible and short- term. However, organisms in the District may indirectly experience long- term, major benefits resulting from an increased area and improved quality of habitat for both wildlife and the globally imperiled montane alluvial forest.

Removal of 56 buildings would allow a variety of plant community types to increase. In the Wonderland Club, these communities include Appalachian montane oak- hickory forest and eastern white pine successional forest dominated by eastern hemlock. In Millionaire's Row, the floodplain of Bearwallow Creek contains Appalachian montane oak- hickory forest, early successional Appalachian hardwood dominated by tulip poplar and southern Appalachian cove forest. The occurrence of large sycamore trees in portions of the Little River and tributary floodplains indicates that these floodplain areas contain the heavily impacted montane alluvial forest, a community that is globally imperiled. Tributaries upslope of the Little River floodplain may have many of the same overstory species and may be classified as the same community type, but they typically lack the biological and structural diversity of the floodplain forest located within the floodplain of larger rivers and streams. Removal of buildings throughout floodplain areas and cessation of chronic disturbance would allow for gradual succession back to this forest type.

In Society Hill, forested areas have been considerably disturbed by past human activity. Plant communities present include early successional Appalachian hardwood forest dominated by tulip tree and red maple, with smaller areas of Appalachian montane oak- hickory, southern Appalachian cove, and Virginia pine successional forest communities. The majority of the Daisy Town buildings

are proposed to be retained under Alternative C, which eliminates the potential for expansion of plant communities on those sites. Chronic disturbance would continue in this area of the District, resulting from pedestrian traffic and vegetation management.

Retention of buildings in Daisy Town and the Chapman (#38) cabin in Society Hill would require hazard tree removal beyond that which is done adjacent to trails and within the Elkmont Campground. For historic buildings and grounds which have public access, the Park typically intensely manages the surrounding landscape and, although efforts would be made to retain as much of the forest communities as possible at Elkmont, the initial effort to remove hazard trees around retained structures would be aggressive. Annual maintenance of the perimeter around historic structures would continue to be intensive, thus truncating the age and size distribution by removing hazard trees that are often old or large and subsequently adversely affecting the old growth stage of development. Implementation of Alternative C would increase the need for hazard tree management above that which is currently performed in throughout the District and would adversely affect plant communities primarily throughout Daisy Town. These indirect effects are expected to be minor, but increase incrementally as more buildings are retained because additional hazard tree management would be required. In the remainder of the District, removal of buildings would eventually allow forests to reach the old growth stage of development.

Within the study area, the globally imperiled montane alluvial forest would have an opportunity to expand up to 22 acres (9 hectares) throughout floodplain and wetland areas (see Table 4- 3) once the buildings are removed and hazard tree management is no longer necessary in these areas. Because no work is proposed in floodplains or wetlands under Alternative C, the potential for reestablishment of the montane alluvial forest is the same as that which would occur under the No Action Alternative.

4.5.2.2.2 Aquatic Communities

Direct, short- term, negligible, adverse effects to aquatic communities could result during implementation of Alternative C. These effects would occur during project implementation, primarily due to the ground disturbance, potential erosion, and runoff into surface waters that could occur following the use of heavy equipment. Protocols for project operations and impact avoidance measures have been developed by the Park to minimize the potential for adverse effects to biotic communities (see Section 2.2.1). Even with incorporation of these measures, the nature of the work may result in unavoidable, yet negligible discharges of sediment into aquatic environments.

The overall indirect effect to aquatic resources in the District would be minor, long- term, and beneficial, resulting from an increase in the vegetation in abutting plant communities due to increased infiltration and associated decreases in runoff and soil erosion. Once vegetation is restored in areas formerly occupied by buildings, the plants would provide protection from erosion by preventing rain from falling directly on bare soils and by stabilizing soils with their root systems.

4.5.2.3 Threatened, Endangered, Rare and Sensitive Species

Like the No Action Alternative, Alternative C would not directly affect federal- listed endangered or threatened species since none are known to occur within or adjacent to the project implementation area. However, removal of the buildings and restoration of disturbed areas would indirectly provide long- term, minor benefits by eventually expanding and improving wildlife habitat. A state threatened species, butternut, and two State Special Concern species, Fraser's sedge (*Cymophyllus fraserianus*) and chamomile grapefern (*Botrychium matricariifolium*) occur within the District. Implementation of Alternative C would create the potential for existing populations of these species to expand into revegetated areas, with the exception of the Daisy Town area in which buildings are proposed to be retained. Similar benefits would also be provided to state-listed species for which the District contains potential habitat. Those species include running bittercress, rough hawkweed, Fraser's yellow loosestrife, broadleaf bunchflower, yellow nodding lady's tresses, peregrine falcon, common raven, North American river otter, longhead darter, and northern pine snake. Site- specific surveys would be conducted before implementing specific actions to determine if special status species existed in the project area. If any were located, the Park would consult with the U.S. Fish and Wildlife Service and the state of Tennessee to determine measures to avoid, minimize, or mitigate adverse effects on the species.

The hellbender (*Cryptobranchus alleghaniensis alleghaniensis*) is a large aquatic salamander with a state designation of "deemed in need of management" (similar to State Special Concern status for plant species). This salamander is not known to occur at Elkmont, but a population does exist within the Little River, downstream from "The Sinks", a natural waterfall located within the Park. As a result, any actions in the District that could impact habitat downstream or water quality within the Little River could indirectly affect the hellbender. Short- term, adverse effects to water quality during construction are expected to be negligible. Following project implementation, expansion of the available area for infiltration should provide minor benefits to water quality, indirectly benefiting aquatic species downstream such as the hellbender.

Although it is not a federally or state- listed species, the synchronous firefly that has been observed in the District would likely benefit from expanded habitat in grassy areas at former building sites and along roadways. However, over the long term, without management to sustain those herbaceous habitats, woody vegetation would eventually encroach upon the area, possibly affecting the synchronism of this species. At this time, the role of synchrony in the ecology of this species is poorly understood, so this impact is difficult to quantify.

4.5.2.4 Wetlands

As described in the No Action Alternative, short- term, direct, minor adverse effects to wetlands would occur during project implementation as a result of disturbance to wetland soils within Millionaire's Row. Although protocols have been established to avoid the potential for impacts to sensitive areas, the environment of the wetlands along Bearwallow Branch is not suitable for machine traffic or even heavy pedestrian traffic due to saturated soil conditions. This disturbance would be temporary and further minimized through seeding of native species over disturbed soils. However, wetlands may experience long- term, minor, indirect benefits from the elimination of chronic

disturbances such as those associated with residential properties to be removed within Millionaire's Row.

Implementing Alternative C would also create long- term, minor beneficial effects to wetlands by increasing several wetland functions and values, including wildlife habitat, aesthetic/visual quality, flood storage, water quality, fish/shellfish habitat and recreation. Improving wildlife habitat in areas adjacent to wetlands would enhance the wildlife habitat function by providing additional upland habitat and by increasing botanical diversity. Wildlife species that migrate into areas formerly occupied by buildings would utilize wetland habitat nearby as well. The aesthetic/visual quality value of the wetland would be improved by planting those sites with native plant species. Removal of impervious surfaces would allow greater infiltration adjacent to the wetlands, thereby reducing the demand for flood storage. Both the water quality and subsequently, the fish and shellfish habitat functions would improve due to the increased area available for infiltration and reduction in the area of impervious surfaces. In addition, repair of culverts to correct erosion problems would provide indirect benefits by ensuring that additional erosion and sediment- laden water does not make its way into abutting wetlands or floodplains. As described in the No Action Alternative, the recreational value of the wetlands potentially would also increase because removal of the buildings would provide more opportunities for recreation and activities focused on observation and appreciation of biotic communities.

4.5.2.5 Water Quality

Water quality can be affected by a variety of activities resulting in discharge to surface waters both during and following project implementation. Alternative C would result in changes to surface water runoff rates and volumes and would require additional discharge of treated effluent into the Little River. Potential impacts to water quality resulting from implementation of Alternative C are described below.

The adverse effects on water quality resulting during project implementation are expected to be short- term and negligible, primarily caused by disturbance created by heavy equipment, used to remove buildings and to transport materials into areas in which restoration, rehabilitation and preservation are proposed. Although Best Management Practices would be followed, there would still be potential for erosion in disturbance areas and sedimentation into water bodies to occur during project implementation. However, once the areas are planted and vegetation has become established, a large area (1.99 acres) of impervious surfaces would be eliminated, reducing runoff that could contaminate District waterways and providing long- term, minor benefits to water quality.

All of the proposed infrastructure components (water lines, sewer lines, parking areas) associated with this and other alternatives would be located to minimize the potential for soil erosion and sediment transport to surface waters within the District. Where possible, to minimize potential impacts, pipelines have been planned to be suspended under bridges to cross streams, rather than be placed under the streambed. Where lines cannot be hung from bridges, they would be bored under the streambed, avoiding the potential for disturbance to the stream substrate and potential impacts to water quality.

The need for additional parking areas varies in each alternative with the initial consideration being the expansion, reconfiguration and resurfacing of existing parking areas, where possible, and then constructing new parking areas where beneficial and/or necessary. Areas currently used for parking are not paved and vehicular traffic has resulted in loss of vegetation, soil compaction and erosion. Projected annual rainfall runoff due to pavement runoff is shown in Table 4- 5. A very small (0.8 percent) increase in runoff over the existing condition is expected to occur as a result of implementing Alternative C. This small quantity would have a negligible effect on water quality.

Sewage Treatment and Pollutant Discharge

No change in water quality would result from sewage treatment and pollutant discharge following implementation of Alternative C. The total amount of discharge pollutants remains at baseline levels under Alternative C (see Table 4- 11) and the incremental increase in effluent discharge in this alternative is such that temperature effects are expected to be negligible (McGill Associates 2004). The effluent discharge rate would remain the same as the existing condition under all alternatives. At the current rate of discharge, thermal impacts are dissipated entirely within three feet of the discharge pipe due to effluent mixing with cooler water in the pipe from the plant to the discharge point. Because the cooling would continue and the rate of discharge would remain the same under all alternatives, there would be no thermal impacts to the Little River as a result of implementing this alternative (McGill Associates 2004).

In addition, installation of the sewer line under Jakes Creek to serve the Appalachian Clubhouse would be above the Little River confluence with Jakes Creek to minimize any in- stream impacts to both Jakes Creek and the Little River. Since the Appalachian Club interior would be rehabilitated for day use, public restroom facilities would be required. The additional wastewater associated with this action that would require treatment is estimated at 1,300 gallons per day. This additional wastewater is minor and can be adequately treated within permitted limits without any improvements to the existing treatment plant. Water quality standards for Outstanding National Resource Waters would continue to be met because concentrations of contaminants would remain below the water supply maximum contaminant level (See Table 4- 12). Therefore, rehabilitation and reuse of the Appalachian Clubhouse would have no effect on water quality.

Collective annualized averages for all water quality contaminant constituents under Alternative C were calculated at levels at least 10 times lower and often 100 times lower than the water supply maximum contaminant level (for an estimation of maximum potential impacts under any alternative, see Table 4- 12). Since the estimated contaminant level from runoff is very low, it would also not affect water quality.

4.5.2.6 Floodplains

Like other alternatives that propose removal of buildings, permanent, moderate benefits to the 100- year floodplain would be achieved through removal of any impervious surfaces currently in and adjacent to the floodplain of Bearwallow Branch and the Little River. As described in the No Action Alternative, an increase in the area available for flood storage would be a direct benefit from removal of three buildings in the 100- year floodplain. Use of these three buildings (Miller (#46), Faust (#47), and Faust garage (#47A)) that lie within the 100- year floodplain would be contrary to NPS policy that expressly prohibits development within floodplains and would therefore require a

formal Statement Of Findings if they were retained. According to Director's Order #77-2, the NPS must "avoid direct and indirect support of floodplain development and actions that could adversely affect the natural resources and functions of floodplains or increase flood risks".

Another direct benefit would be an increase in the area of associated plant communities, such as the montane alluvial forest, that is expected to regenerate at former building sites. Removing buildings in areas adjacent to floodplains would provide permanent, indirect benefits by increasing the area available for infiltration. Additional indirect benefits would be provided by prohibiting vehicular access to Society Hill and because removal of buildings within and adjacent to floodplains would eliminate future ground disturbance and soil compaction associated with residential use.

4.5.2.7 Air Quality

Air quality can be affected by increases in vehicular traffic and by how this traffic moves throughout the District. Increased engine idling times will generally occur as traffic congestion causes increases in travel time along roadways, within parking areas, at gates, and at destination points that are visible from the roadway, such as at wayside exhibits. Longer idling times result in increased emissions.

As in the No Action Alternative, projected visitation to the District is not expected to change following implementation of Alternative C. However, there would be a temporary increase in emissions due to operation of equipment during project implementation. Therefore, direct adverse effects to air quality would be short- term in duration and negligible, occurring only during construction. These effects could be minimized by reducing equipment idling times, ensuring that all equipment is in good operating condition, and by performing construction during the time of year when ozone is least likely to form (April to September).

Once construction is complete, specifics of this alternative that could affect the quantity of emissions discharged into the District include increased traffic within the District and construction of parking lots in the Appalachian and Wonderland Clubs. The results of an analysis was performed by the Park to evaluate the potential nitrogen deposition and nitrogen dioxide (NO2) impacts from the use of the proposed Appalachian Club and Wonderland Club parking lots show impacts very far below the nitrogen deposition threshold of 0.01 kilograms per hectare per year. The impacts were in the range of one-ten thousands of the nitrogen deposition threshold. The visible haze analysis indicates no visible haze impacts. The maximum impact of nitrogen dioxide to the annual NO2 Class I PSD increment was approximately 0.017 micrograms per cubic meter (ug/m^3), or one- sixth of the EPA Class I significance level (0.1 ug/m^3). A visible plume analysis using the EPA VISCREEN model in the Level 1 mode also indicated that there will not be a visible plume impact from the vehicle emissions.

In an independent air quality assessment performed by McGill Associates based on a busy Saturday in the summer, the emissions of the key air pollutants resulting from the condition created by Alternative C in 2015 are projected to be the same as the existing condition (see Table 4- 8). As a result, no indirect effects to air quality are anticipated to occur as a result of implementing Alternative C.

4.5.3 Impacts on Interpretation and Visitor Use

Implementation of Alternative C requires removal of many of the historic buildings in the District. Removal of the buildings is not expected to change the number of visitors to the area, although there would be a moderate increase in the number of internal visitor trips as compared to the No Action Alternative to areas proposed for interpretive use.

Under Alternative C, the Elkmont Nature Trail brochure would be revised to include historical information about Elkmont, and the Appalachian Clubhouse would be restored for public day use rental. An orientation kiosk with exhibits and eight other wayside exhibits would be installed throughout the District. Another exhibit would be installed inside the Appalachian Clubhouse, and the clubhouse would serve as a self-guiding museum. These provisions would have a direct, long- term, moderate, beneficial effect on interpretation by providing visitors with materials and displays relating specifically to the District.

4.5.3.1 Visitor Experience

Although removal of some of the buildings and restoration and preservation of others is not expected to significantly change visitor use, there would be a change in the level of interpretive efforts. Providing additional historical information in the Elkmont Nature Trail brochure and eight wayside exhibits in addition to those at the orientation kiosk and inside the Appalachian Clubhouse would indirectly have a long- term moderate beneficial effect on visitor experience in the District. The visiting public would have the opportunity to learn about the establishment and history of Elkmont, and the cultural and natural resources of the District. One additional cabin (Chapman (#38)) would be restored in Society Hill, allowing visitors to learn about Colonel Chapman's role in the establishment of the Park. An exhibit in Millionaire's Row discussing the natural history of synchronous fireflies would be included. Installation of interpretive exhibits and updating of trail brochures in Alternative C would indirectly result in long- term, moderate, beneficial effects to the visitor experience by allow visitors to understand what they are viewing in the District and to achieve a sense of time and place associated with the buildings.

Currently, the buildings and adjacent grounds are closed to the public and the present condition of the District allows for multiple opportunities to view the intact cultural landscapes, including the buildings and smaller- scale features, from existing roadways. Thus, the focus on the portion of the District that contains buildings is on investigation and discovery of cultural resources within their setting. If Alternative C was implemented, visitor experience would change to one that balances natural resource restoration with increased cultural resource interpretive opportunities available at wayside exhibits, at cabins retained in Daisy Town and Society Hill, through use of the Appalachian Clubhouse with interior exhibits and retention of cultural landscape elements. The remainder of the District would be restored to native plant communities.

4.5.3.2 Visitor Facilities

Visitor facilities would experience long- term, moderate direct and indirect benefits as a result of implementing Alternative C. Although most of the historic buildings would be removed under this alternative, a variety of visitor facilities would be added as well. A total of eight wayside exhibits, an orientation kiosk with exhibits, and interior exhibits at the Appalachian Clubhouse would be added. These exhibits would provide visitors with

information on the natural environment and interpret the cultural resources. With the addition of the exhibits, visitors would gain another opportunity to understand the history behind establishment of the Town of Elkmont, the history of the Appalachian and Wonderland Clubs and train stations, and to learn about the establishment of the Park and how it affected Elkmont. Exhibits describing the natural and cultural history of the area would be placed strategically to orient visitors as they enter the District and most of the major sections of the District, including the campground.

As a result of implementing Alternative C, additional benefits would be provided by the construction or repaving of four parking areas in the District, repaving or widening several roads, resurfacing of walking paths and restoration and rehabilitation of the Appalachian Clubhouse. In addition, day use and restroom facilities and interior interpretive exhibits would be provided at the Appalachian Clubhouse. These facilities would be accessible to the visiting public, reducing the need for visitors to enter the Elkmont Campground to use facilities there. Some of the areas in which visitors currently park are not paved and are eroded, rutted and generally disturbed. Pervious pavement lots would provide a stable surface for parking while preserving the aesthetic quality of the environment expected by the visiting public in a National Park. Collectively, these modifications would indirectly provide long- term, moderate benefits to visitor facilities by allowing for the opportunity for visitors to view and learn about the remaining Elkmont buildings and cultural landscape components, history of the area, and important figures in the history of the Park.

4.5.4 Impacts on Socioeconomic Environment

Alternative C would have no direct, indirect or cumulative effect on the socioeconomic environment.

4.5.4.1 Population and Environment

Alternative C would have no direct, indirect or cumulative effect on local or regional populations.

4.5.4.2 Land Use

Implementation of Alternative C would indirectly result in long- term, moderate beneficial effects to land use. These effects would be achieved through opening the grounds to the public following removal of some of the buildings and structures and by providing additional opportunities for those uses described in the land use zone designations in the 1982 General Management Plan. Implementation of Alternative C would continue to allow for use of public roadway corridors, accommodations at the existing Park quarters, and picnicking and camping at the Elkmont Campground. Historical and natural resource interpretation would be increased over that which currently offered through installation of a variety of exhibits, retention of some buildings for interpretive uses, including the Chapman cabin in Society Hill, and the Appalachian Clubhouse as a public day use rental facility and self- guiding museum. These uses would be supported by alterations to existing infrastructure including new parking areas and restroom facilities. Internal trips within the District are expected to increase slightly (Table 4- 7); however, overall visitation to the District is not expected to increase relative to the No Action Alternative. Therefore, increased visitor opportunities within the District are not expected to result in land use conflicts (such as traffic congestion, crowding, etc.) if Alternative C is implemented.

4.5.4.3 Access and Circulation

During implementation, Alternative C would create negligible, short- term, adverse effects on access and circulation. The buildings and grounds are currently closed to the public and would remain closed during construction to prevent safety hazards to visitors. As a result, alternate access to trailheads in the District may have to be provided. To avoid impacting campground visitors, construction activities would take place when the campground is closed (December to February). These measures would greatly reduce the potential for adverse effects to access and circulation. During removal of the buildings, construction vehicles would add to visitor traffic to and from the District and might cause minor delays due to the reduced capacity for trucks carrying heavy loads to accelerate.

Once implemented, Alternative C proposes a low intensity of reuse for the District including exterior restoration of cabins in two areas for use as interpretative exhibits. Because the level of redevelopment is low, this alternative would affect access and circulation. An increase in total daily trips is expected to occur under this alternative, from 1,340 in the No Action Alternative to 2,323. Internal pedestrian trips would increase from 431 to 435. These changes in trips are associated primarily with visitors traveling between areas of the District to view exhibits and to use other facilities. A complete comparison of estimated change in volume of trips between alternatives is provided in the Tables 4- 6 and 4- 7 at the end of this chapter.

The level of service is not expected to change along District roadways, and no change in average travel speed, percentage of time spent following or headway between vehicles would be experienced. The potential for pedestrian and vehicle conflicts would be minimized through installation of the Daisy Town path and a gate at the road to Jakes Creek Cemetery. Although the potential for vehicle and pedestrian conflicts would still exist, these proposed modifications would provide added safety to visitors, a long- term, and moderate indirect benefit as compared to the conditions that would remain under the No Action Alternative.

4.5.5 Impacts on Other Resources

4.5.5.1 Viewshed

Impacts to visual quality consist of changes that would alter or obstruct (1) visible landscape features from dominant viewpoints established as part of this analysis; and (2) access and visibility to dominant or important viewpoints or sequences of viewpoints. The primary viewpoints or sequences of viewpoints within the District that still exist are from existing roadways and trails. Currently, the building grounds are closed to the public and access to many of the viewpoints within the District is prohibited due to safety concerns related to the conditions of the buildings.

The established baseline for this environmental analysis and the associated visual resource analysis is the No Action Alternative. This baseline identifies a naturally regenerated landscape within the study area as the condition for the visual analysis. The buildings within the study area would be considered obstructions to the natural viewshed that would be removed if the General Management Plan (the No Action Alternative) was implemented. As a result, long- term, indirect, minor, adverse effects would be created by retention of most of the Daisy Town buildings, the Appalachian

Clubhouse and the Chapman cabin (#38) on Society Hill. Although retention of these buildings would adversely affect visual quality by obstructing the natural viewshed, some long- term, minor benefits to visual quality and aesthetics would be realized through removal of the remainder of the buildings in the District and increasing the area available for restoration of native plant communities (photos 3 through 6A in Appendix D depict the existing views of a variety of historic buildings and simulations of the potential views following removal of these buildings). In addition to retention of some buildings, Alternative C proposes to retain foundations, rock walls and other cultural landscape components. These components obstruct views of the District's natural resources to a minor extent. Direct, adverse impacts to visual quality and aesthetics are expected to occur during implementation of Alternative C because of the presence of machinery and ground disturbance, these effects would be short- term and negligible.

The viewshed sensitivity maps shown in the Visual Quality Assessment (Appendix D) indicate the areas visible from a variety of viewpoints throughout the District. The direct effect on the composite viewshed would also be long- term, minor, and adverse under Alternative C due to retention of some buildings, structures and cultural landscape components. Composite viewshed areas shown (Figures 7, 8 and 9, Appendix D) would also be adversely impacted by building retention with regard to the area that is visible from the transportation corridors.

4.5.5.2 Soundscape

Direct, short- term, minor adverse effects on the soundscape are expected to occur during implementation of Alternative C due to construction activities. The high noise levels of combustion- powered equipment, particularly due to earth moving equipment (usually diesel), are expected to be the primary contributor to the sound levels during construction and can interfere with the ability of individuals near the work site and passersby to hear speech. Peak noise levels from construction as measured at a distance of 50 feet may vary from 70 dBA to 100 dBA. The major sources of construction noise in this alternative may include removal of buildings, hauling, grading, and paving. Overall, construction noise is relatively short in duration and would be restricted to daytime hours at the time of year in which visitation is expected to be the lowest.

Following project implementation, it is expected that future noise levels under Alternative C would remain in the range of 50 to 60 dBA. As in the No Action Alternative, since these noise levels do not exceed the noise abatement criteria of 67 dBA, Alternative C would have no long- term effect on noise levels in the District.

4.5.6 Impacts on NPS Operations

In addition to removal of historic buildings, Alternative C includes modifications to existing infrastructure, increasing the number of parking lots and paving with pervious pavement, restoration of cabins for use as interpretive exhibits and restoration and rehabilitation of the Appalachian Club for day use. All of the new visitor facilities, exhibits and infrastructure would have to be maintained by NPS staff. However, the effect of implementing Alternative C on NPS operations would be permanent, moderate and beneficial, primarily because the need to stabilize, maintain and police buildings across the District would be largely eliminated, with the exception of the 16 cabins retained in Daisy Town, the Chapman (#38) cabin in Society Hill and the Appalachian Clubhouse. Therefore, although there are costs associated with restoring and

preserving the remaining buildings and for maintaining the upgraded infrastructure (i.e. cleaning pervious pavement, maintaining exhibits, etc.), this cost would be reduced over the existing condition. The costs of implementing this alternative would also be offset to some extent by the revenue achieved from rental of the Appalachian Clubhouse as a day use facility.

Indirect beneficial effects would result due to removal of the Elkmont buildings. The buildings have the potential to contain hanta virus, a disease spread by rodents, and histoplasmosis, which is spread by bats. Both of these contagions can be fatal to humans who come into contact with them. Some of the buildings contain a variety of debris, ranging from broken glass and fallen plasterboard to lead- based paint. Removal of hazards that pose a danger to the visiting public would remove the potential for harm, reduce the need for NPS law enforcement in the District, and ultimately provide permanent, moderate benefits to NPS operations.

Some of the expenditures required for vegetation management adjacent to the buildings would be eliminated as buildings are removed, indirectly benefiting NPS operations through a reduction in costs associated with staff time and equipment needs. However, the overall indirect effect on NPS operations due to hazard tree and other vegetation management is expected to be long- term, minor and adverse because most areas of the District and the grounds would be open to the public and would require aggressive vegetation management. Because the grounds would be opened to the public, even where buildings are removed the NPS must manage vegetation to provide for visitor safety. Hazard trees adjacent to exhibits, trails and roadways would continue to be removed as needed to reduce the possibility that visitors could be harmed by falling trees.

4.5.7 Cumulative Effects

The cumulative effects of implementing Alternative C would be primarily limited to the District and the Little River watershed. It would add incremental beneficial effects to cumulative effects on wetlands and floodplains by expanding the area available for flood storage in the watershed.

Like all alternatives discussed previously, beneficial cumulative effects would generally be created by removal of buildings and subsequent revegetation throughout the District under Alternative C. Reestablishment of native plant communities provides multiple benefits to the aquatic and terrestrial environment through soil stabilization and reduction in erosion and sedimentation. Although water quality in the Little River and its tributaries has remained excellent, contributions of sediments from erosion or petrochemicals from parking area runoff can add to the existing load already entering the river system from the high number of visitors to the Park and surrounding gateway communities. Reduction in runoff and elimination of erosion help to lower the potential for contaminants to enter the river. At the same time, revegetation of native plant communities increases the area of available habitat for a variety of flora and fauna, including reestablishment of the globally imperiled montane alluvial forest.

Invasive, non- native plant species thrive in disturbance areas. The spread of these species could be further exacerbated by increased disturbance caused by pedestrian traffic into sensitive areas. Permanent revegetation with native species would create a

beneficial cumulative effect by reducing the area available for invasive, non- native species to become established, thereby decreasing the potential for these species to infiltrate into surrounding areas of the Park. Failing to continue a comprehensive, invasive, non- native species management program at the District could, over time, result in the spread of those species into other areas of the Park adding exponentially to the existing adverse effects that invasive species have on the Park's botanical diversity.

The loss of aboveground cultural resources in Alternative C is significant and would result in a permanent adverse, cumulative effect. While the Park contains a variety of historic buildings and cultural landscape components, the District's buildings represent the only remaining representative group constructed during that period of significance in the Park. Other resort properties representing this time period, such as hotels and lodges inside the Park and hotel and cabin communities outside the Park, have been removed or may no longer retain historic integrity. When added to past actions, implementation of this alternative would cumulatively result in loss of groupings of buildings representing this period in southern Appalachian history.

4.5.8 Conclusion

Of the seven alternatives, Alternative C was selected as both the environmentally preferred alternative and the agency- preferred alternative because it strikes the best balance between natural resource values and cultural resource values and has a favorable cost- benefit ratio.

In selecting the preferred alternative for the Elkmont Environmental Impact Statement/General Management Plan Amendment, the National Park Service employed the "Choosing By Advantages" or "CBA" decision- making process. This decision-making process analyzed the advantages of each developed alternative and considered the beneficial and negative impacts as described in the EIS in order to quantify and rank total advantages for each alternative. Proposed costs were applied to all ranked alternatives, respectively, and a cost- benefit analysis was conducted. The alternative with the most gains or advantages for the associated cost was then selected as the preferred alternative.

The project alternatives were considered and each was individually assessed under four factors. The four factors assessed were Protection of Natural Resources; Protection of Cultural Resources; Provision for Visitor Education and Enjoyment; and Protection of Public Health, Safety and Welfare.

The decision- making process for selecting the preferred alternative considered all identified factors in order to support and fulfill the purposes of the Park as stated in the enabling legislation. In addition to Park purpose, other laws, policies and guidelines directly relevant to the National Park Service were taken into account as part of the decision- making process. The overall laws and policies guiding National Parks are intended to prevent the loss of resources; maintain and improve the condition of resources; protect public and employee health, safety and welfare; and improve operational efficiency and sustainability. This guidance is intended to safely protect resources while at the same time provide opportunities for enjoyment of the resources to present and future park visitors. Decisions in this Environmental Impact Statement /

General Management Plan Amendment involve both a broad view of the Park as well as issues specific to Elkmont and involve a clear evaluation of gains and benefits for each developed alternative. The analysis of alternatives for each factor was based on direct, indirect and cumulative impacts described in this document.

Implementation of Alternative C would result in maintenance and / or enhancement of the long- term productivity of many of the natural resources, including soils, floodplains, aquatic and terrestrial communities, wetland functional values, threatened, endangered, rare and sensitive species, and water quality. In general, the overall long- term productivity of all biotic resources would be benefited due to the increase in land available for restoration of native plant communities. Removal of buildings and structures throughout the District, especially within the floodplain along the Little River ("Millionaire's Row" area), would increase the area available for reestablishment of the imperiled montane alluvial forest, a globally significant resource. In addition, restoration of native plant communities would further protect water quality of the Little River, a listed Outstanding National Resource Water.

Cultural resources preserved under this alternative would be enhanced over the long-term; minor to major beneficial effects would be achieved by retaining, and preserving a core group of historic buildings and most cultural landscape characteristics and features. The buildings and landscape features proposed for retention under this alternative represent a realistic and feasible long- range management option for the preservation of Elkmont cultural resources. Preservation of the cabins and rehabilitation of the Appalachian Clubhouse in accordance with The Secretary of the Interior's Standards for the Treatment of Historic Properties would also provide long- term benefits to cultural resources. All work would be carried out under the direction of trained historic preservation specialists.

The expanded interpretive opportunities, providing access to trails and exhibits, and correction of erosion problems at culverts are all beneficial effects. Other areas that would benefit from Alternative C are visitor facilities, land use and visitor experience. Preservation of 16 cabins and rehabilitation of the Appalachian Clubhouse in Daisy Town, as well as preservation of the Chapman cabin on Society Hill, would provide more opportunities for cultural resource interpretation.

Alternative C proposes preservation of the core historic area at Daisy Town. Because of the physical layout and design of buildings and landscape elements such as stone walls and walkways, Daisy Town also provides the best opportunity to demonstrate the historic activities of this club community. This alternative includes the Chapman cabin in Society Hill for its associative value with Colonel David Chapman, who was influential in the establishment of Great Smoky Mountains National Park and proposed under mitigation, the preservation of Cabin 42, "River Lodge" or "Spence Cabin" for the association with the former president of the Little River Lumber Company.

NPS operations would benefit following implementation of this alternative due to the removal of buildings that were built for seasonal use only and suffered from deferred maintenance toward the end of their use by lessees. These buildings currently require substantial NPS staff efforts and funding to stabilize and maintain. The overall long- term effect to NPS operations of retaining 18 buildings would be minor, but adverse due to the

increase in Park staffing required to manage natural and cultural resources as well as visitor use and to provide for visitor safety. However, NPS operations would benefit from the revenue realized as a result of rental of the Appalachian Clubhouse as a day use facility. This revenue would offset some of the long- term operation and maintenance costs associated with implementing Alternative C.

An adverse effect to cultural resources would occur due to removal of 32 contributing buildings and the associated sense of spatial organization and layout. Implementation of Alternative C would create adverse effects to specific cultural resources because historic contributing elements would be removed. The permanent removal of these 32 contributing buildings within the Elkmont Historic District would constitute an irretrievable commitment (i.e., loss) of cultural resources as defined in section 102(c)(v) of the National Environmental Policy Act. A small Historic District within the Appalachian Club portion of Elkmont would remain following the implementation of this alternative.

Natural forest regeneration, as described in the 1982 GMP, would be prevented where selected buildings are retained under this alternative. Removal of all but one cabin in the Millionaire's Row area will allow for substantial regeneration of the particularly significant and imperiled montane alluvial forest. Indirect, minor, adverse effects on Elkmont's cultural resources would include wear and tear to features of the Appalachian Clubhouse and the retained cabins because of increased visitation. There is also potential for irreversible impacts to archeological resources as a result of implementation of this alternative, but it is possible that those effects could be eliminated or minimized through proper planning and avoidance measures.

4.5.9 Unavoidable Adverse Effects of the Environmentally and Agency Preferred Alternative

As discussed previously, the goals of NPS management for all resources are achieved through consideration of potential resource impacts and identification of a project alternative that balances unavoidable impacts with the goals and objectives for the project. Resource impacts associated with each alternative differ greatly in their context, intensity and duration and this balanced approach considers the merit of all resources equally.

In meeting the goals and objectives for the Elkmont Historic District, some resource impacts are unavoidable because they facilitate other aspects of an alternative designed to achieve certain established goals or objectives for the District. For instance, where above- ground cultural resources are retained, restoration of native plant communities is not possible. Likewise, plant community restoration can be implemented in those areas in which buildings and other cultural components have been removed. The NPS has recommended Alternative C as its Agency Preferred Alternative because it considers the value of all of the District's resources equally, with emphasis on the compatibility of the alternative implementation with the long- term objectives for all resources in the District.

Unavoidable adverse impacts associated with implementing Alternative C are primarily direct, short- term, and negligible and would affect soils, biotic communities, noise, air quality, visitor experience, visitor use, access and circulation, and aesthetics and viewsheds. These effects would be caused primarily by ground disturbance during

installation of water lines, sewer lines, and parking areas; increased erosion potential; increases in noise and emissions from construction equipment; and the short- term adverse effects on visual quality and aesthetics during and immediately following construction, prior to reestablishment of vegetation in disturbed areas.

During construction, air quality and noise levels could be adversely affected resulting from the use of heavy equipment. Likewise, use of this equipment would result in soil disturbance and some damage to vegetation even if construction protocols established by the Park to minimize adverse impacts are followed. These effects are expected to be temporary and limited to the construction period and shortly thereafter until restoration of vegetation occurs. Indirect effects on cultural resources would include wear and tear resulting from increased visitation to features of the Appalachian Clubhouse and other interpretive features in Daisy Town and at the Chapman cabin.

4.6 Impacts of Alternative D

Both options for Alternative D (D1 and D2) entail the retention of 16 cabins and the Appalachian Clubhouse in Daisy Town, the Chapman cabin (#38) in Society Hill, the Spence cabin (#42) in Millionaire's Row, six cabins in the Wonderland Club, and removal of all other historic buildings in the District, either by mechanical means or by hand. The six cabins in the Wonderland area would serve as temporary housing for visiting scientists. In addition, D2 proposes reconstruction of the Wonderland Hotel and rehabilitation of the Annex for use as a curatorial storage facility.

Overall, visitation to the District following implementation of D1 or D2 is expected to increase by an average of 26 visitors per day, plus a maximum additional 18 visiting scientists per day utilizing the temporary housing (see Table 2- 20). The length of an average daily visit and the internal trips within the District are also expected to increase due to the opportunities provided by day use of the Appalachian Clubhouse, the walking tour through Daisy Town, the various exhibits throughout the District, and the Wonderland curatorial facility (under D2). Existing recreational use would continue to occur. New exhibits are proposed under this alternative and the Elkmont Nature Trail brochure would be updated to include natural and cultural information on Elkmont. The Park would continue to implement its existing natural resource management activities.

Some changes to parking and circulation within the District would be required. Once this work was completed, a moderate increase in operation and maintenance expenditures would be required beyond what the Park already budgets for the roads, parking, water and wastewater systems, and operations and staffing.

4.6.1 Impacts on Cultural Resources

Buildings and Cultural Landscape

Implementation of Alternative D would result in direct, permanent, major, adverse effects to the aboveground cultural resources of the District, due to removal of 24 contributing buildings under D1 or 22 contributing buildings under D2.

Of the 24 contributing buildings proposed for removal under D1, 22 buildings were listed as "Poor" or "Fair to Poor" condition in 2003. Of these same 22 buildings, two (Wonderland Hotel (#58) and the Knaffl cabin (#36)) have significant portions that have collapsed and at least four other cabins have significant problems with structural integrity.

The cultural landscape characteristics and features of Elkmont, such as the historic swimming hole at Little River, stone walls and a footbridge over Bearwallow Branch, would be retained under this alternative as would eligible cultural landscape features. The preservation of the retained cabins, the rehabilitation of the clubhouse, and if D2 is implemented, the reconstruction of the Wonderland Hotel would be conducted in accordance with *The Secretary of the Interior's Treatment Standards*.

New elements would be introduced into the District, such as the orientation kiosk with exhibits, interior exhibits, eight wayside exhibits, new parking areas, the paths and roads, a flow equalization basin as part of a required wastewater treatment system upgrade,

pumping station access hatches and one electrical control panel, and stream bank stabilization work at the eroded culverts. Long- term, indirect, minor adverse effects on the District would include a modest increase in visitation and traffic congestion, along with wear and tear from increased visitation to the Appalachian Clubhouse, which is proposed as a public day use rental facility and self- guiding museum; visitation to the Wonderland curatorial facility (if D2 is chosen); use of the visiting scientists' temporary housing; and potentially, from visitation to the porches of the retained Daisy Town buildings and the Chapman and Spence cabins.

Alternative D would result in beneficial effects due to the retention of the Appalachian Clubhouse, the 16 Daisy Town cabins, the Chapman and Spence cabins, and the six Wonderland cabins, as well as some of the District's cultural landscape characteristics and features, including a footbridge over Bearwallow Branch. If D2 is implemented, long- term, beneficial effects would be achieved through reconstruction of the Wonderland Hotel (as a contemporary re- creation of the original building) and restoration and rehabilitation of the Annex for Park curatorial storage. The restoration, rehabilitation, preservation and reconstruction of the retained buildings in accordance with *The Secretary's Treatment Standards* would be a minor to major beneficial effect, as would restoration and preservation of the one noncontributing cabin (Swan (#4)) to make it a contributing element.

The nine wayside exhibits, orientation kiosk with exhibits, four parking areas (five if D2 is chosen), new paths and roads, and stream bank stabilization at eroded culverts would create minor, but acceptable adverse effects on cultural resources. The proposed new elements would constitute a minimal visual change District- wide. In addition, the proposed parking areas, paths, and roads would be located in areas already visually impacted by existing infrastructure.

The proposed utility lines would be buried in the ground, thereby removing intrusive power poles that postdate the period of significance. The below- ground pumping stations would not be visible, except for small access hatches placed flush with the ground. The pumping station behind the Wonderland Hotel would have an aboveground electrical control panel roughly two to three feet tall surrounded by a security fence. These minor elements would be designed to be as unobtrusive as possible. The proposed flow equalization basin would be located at the edge of the District adjacent to the modern wastewater treatment plant in an area visually removed from the District's historic buildings. The long- term, indirect, minor effects on the District and its landscape caused by the modest increase in visitor trips to and from the exhibits would not appear to reach the level of adverse effect under Section 106, because overall visitation is expected to increase only slightly and the use specified for the buildings and features is primarily interpretive.

Archeological Resources

As with all alternatives, the potential for Alternative D to impact archeological resources depends on the level, extent and location of ground- disturbing activities. These alternatives propose removal of fewer buildings than the No Action Alternative. However, installation of sewer, water, and electrical lines, parking area construction and road work would result in additional ground disturbance that could affect archeological resources. These impacts would be direct, permanent, and could be major. In addition,

there is the potential for increased visitation and pedestrian traffic to result in site erosion following trampling of the plant cover. Additional site erosion could result in disturbance to shallowly–buried archeological deposits. These impacts would be indirect, permanent and could potentially be minor to moderate. The areas where archeological resources could potentially be adversely affected include one locus where significant resources have been documented, seven loci where potentially significant resources have been identified, and two areas that have not yet been surveyed. There would be no effect on potentially significant resources at nine loci.

Compared to the No Action Alternative, Alternative D could adversely affect three additional loci where potentially significant resources have been identified through construction of the Little River Trail and Wonderland Hotel parking areas, and installation of water and sewer lines. The ultimate impacts to archeological resources due to project implementation would depend on the outcome of additional investigations. NPS staff would continue established resource protection measures for the identification and treatment of archeological resources on a case- by- case basis. The proper execution of avoidance or protective strategies could ensure that no effect on archeological resources would occur.

Section 106 Determinations

Under Section 106 of the National Historic Preservation Act, the removal of 22 to 24 contributing buildings within the NRHP- listed Elkmont Historic District would constitute an adverse effect.

As discussed under the previous archeology discussion, the potential effects to archeological resources under Alternative D could also result in a determination of adverse effect if the proper avoidance or protective strategies for archeological resources that could be potentially impacted, as discussed above, are not implemented.

All mitigation will be determined through formal consultation with the Tennessee State Historic Preservation Office, the Advisory Council on Historic Preservation and the Chickasaw Nation and Eastern Band of the Cherokee Indians Tribal Historic Preservation Officers. The exact type (s) and cost of the mitigation cannot be calculated at this time.

4.6.2 Impacts on Natural Resources

Impacts to natural resources due to implementation of Alternative D would result primarily from ground- disturbing activities associated with building removal and infrastructure modifications. These effects are discussed below for each natural resource.

4.6.2.1 Soils

This alternative proposes removal of a total of 49 buildings in Elkmont Historic District (47 if D2 is chosen). As a result, short- term, negligible adverse effects on soils would occur during project implementation if the use of heavy machinery and other demolition equipment is necessary for removal of the buildings. Short- term, moderate, adverse effects to soils would occur as a result of installation of new water and sewer lines, underground utility lines, road repair and construction and paving operations. All of these activities would require either excavation or grading, resulting in adverse effects to

soils over a wider area in the District than in the No Action Alternative. Impacts occurring during construction would be mitigated by protocols established by the Park to minimize impacts to soils and the adverse effects on soils due to project implementation activities would be temporary.

A large area of impervious surfaces would be eliminated when the buildings are removed (1.64 acres in D1 and 1.17 acres in D2). Subsequently, additional area would be available for surface water infiltration and runoff quantities would decrease in those areas, providing long- term, moderate, beneficial effects to soils. Once vegetation is reestablished in areas formerly occupied by buildings, the plants would supply additional protection from erosion by preventing rain from falling directly on bare soils and by stabilizing soils with their root systems. The beneficial effects provided by the vegetation would increase as the plants mature.

Although impervious surfaces would be removed in some areas under this alternative, in other areas, impervious surfaces would be added by the paving of roads and parking areas. Additional incremental adverse impacts from soil compaction and trampling of plants would occur due to a small increase in the estimated number of visitors and a modest increase in internal pedestrian trips (see Table 4- 7).

An additional 1.5 acres (D1) and 2.1 acres (D2) are proposed to be covered with pavement. Pervious concrete would be used in parking areas and some infiltration is possible where this material is used. However, the surface would produce higher rates of runoff than undisturbed, vegetated surfaces. The long- term, indirect adverse effects are expected to be minor following implementation of D1, with a 2.2 percent increase in surface water runoff over the existing condition. Surface water runoff would increase by approximately 4.9 percent under D2. This increase in runoff could cause additional soil erosion and subsequent sedimentation of surface waters, resulting in a long- term, indirect, moderate adverse effect on soils. Sediment loading would result in degradation of water quality due to contamination of runoff with petrochemicals and other contaminants from automobiles.

4.6.2.2 Biotic Communities

4.6.2.2.1 Terrestrial Plant Communities

Retention of buildings throughout the District would require hazard tree removal beyond that which is done adjacent to trails and within the Elkmont Campground. For historic buildings and grounds which have public access, the Park typically intensely manages the surrounding landscape and, although efforts would be made to retain as much of the forest communities as possible at Elkmont, the initial effort to remove hazard trees around retained structures would be aggressive. Annual maintenance of the perimeter around historic structures would continue to be intensive, thus truncating the age and size distribution by removing hazard trees that are often old or large subsequently, adversely affecting the old growth stage of development. Implementation of Alternative D would increase the need for hazard tree management above that which is currently performed in the District. These effects would be direct, occurring during project implementation, and indirect as a result of continued hazard tree management. The effects are expected to be moderately adverse, and

would occur over a larger area in these alternatives than in previously discussed alternatives because more buildings are retained. Effects would be incrementally greater if D2 is implemented than D1 due to retention of the Wonderland Hotel and Annex.

Removal of the buildings under Alternative D would allow a variety of plant community types to increase. In Millionaire's Row, the major floodplain contains Appalachian montane oak- hickory forest, early successional Appalachian hardwood dominated by tulip poplar, Appalachian white pine and southern Appalachian cove forest areas could potentially expand. The occurrence of large sycamore trees in portions of the Little River and tributary floodplains indicates that these floodplain areas contain the heavily impacted montane alluvial forest, a community that is globally imperiled. Tributaries upslope of the Little River floodplain may contain many of the same overstory species and may be classified as the same community type, but they typically lack the biological and structural diversity of the floodplain forest located within the floodplain of larger rivers and streams. Removal of buildings throughout floodplain areas and cessation of chronic disturbance would allow for gradual succession back to this forest type. Retention of one building, River Lodge or "Spence Cabin" (#42), and the associated parking area within the montane alluvial forest community, would create moderate impacts directly as a result of hazard tree removal and indirectly as a result of increased visitation and use.

Within the study area, the globally imperiled montane alluvial forest would have an opportunity to expand up to 12 acres (5 hectares) throughout floodplain and wetland areas (see Table 4- 3) once the buildings are removed and hazard tree management is no longer necessary in these areas.

In Society Hill, forested areas experienced considerable disturbance due to past human activity. Plant communities present include early successional Appalachian hardwood forest, dominated by tulip tree and red maple, with smaller areas of Appalachian montane oak- hickory, southern Appalachian cove, and Virginia pine successional forest communities. Most of the buildings in the Wonderland Club and Daisy Town are proposed to be retained, eliminating the potential for expansion of plant communities on those sites. Chronic disturbance would continue in those areas of the District, resulting from pedestrian traffic and vegetation management.

Short- term, moderate, direct adverse effects are expected to occur during construction as well as indirect, long- term, negligible beneficial effects due to building removal following project implementation. During construction, excavation for sewer and water lines would disturb vegetation and most likely require removal of smaller trees and root masses. The use of heavy equipment for removing buildings along with the vehicular and pedestrian traffic would likely cause temporary disturbance of plant communities. Under D2, the activities required to reconstruct the Wonderland Hotel and access to it and the Annex would require ground disturbance for installation of sewer and water lines, and paving of parking areas. Following construction, the expected increase

in visitation, although still modest, and the increase in pedestrian traffic would further increase the stress on plant communities and wildlife habitat.

Although available wildlife habitat could be expanded through removal of many of the buildings, the habitat may not be suitable for a wide variety of species that cannot tolerate the presence of humans and motorized vehicles. Increased visitation would be accompanied by a proportional increase in the improper storage and disposal of food items. Food brought into day use areas and garbage attracts wildlife, increasing the potential for human – wildlife encounters. Encounters with black bears, raccoons and even small rodents can be dangerous for both the human and the wildlife species involved. Increased traffic would also increase the potential for vehicular collisions with wildlife. These impacts on wildlife would be minor because they affect individuals and not entire populations.

4.6.2.2.2 Aquatic Communities

Direct, short- term, negligible, adverse effects to aquatic communities could result during implementation of Alternative D. These effects would occur during project implementation, primarily due to the ground disturbance, potential erosion, and runoff into surface waters that could occur following the use of heavy equipment. Protocols for project operations and impact avoidance measures have been developed by the Park to minimize the potential for adverse effects to biotic communities (see Section 2.2.1). Even with incorporation of these measures, the nature of the work may result in unavoidable, yet negligible discharges of sediment into aquatic environments.

The overall indirect effect to aquatic resources in the District would be minor, long- term, and adverse, resulting from an increase in impermeable surfaces and associated runoff into surface waters. Increased visitation will result in trampling of vegetation and loss of soil stability. Increased traffic and parking will result in deposition of petrochemicals, which, when mixed with rainfall runoff, can result in contamination into adjacent aquatic systems.

4.6.2.3 Threatened, Endangered, Rare and Sensitive Species

Alternatives D would have no direct effects on federally- listed threatened or endangered species, since none are known to occur within the proposed project implementation area. A state threatened species, butternut, and two State Special Concern species, Fraser's sedge (*Cymophyllus fraserianus*) and chamomile grapefern (*Botrychium matricariifolium*), occur within the District. Because many of the buildings would be retained under Alternative D and visitation is expected to increase following project implementation, increases in suitable habitat for threatened, endangered, rare and sensitive species are expected to be minor. Although minor increases in their habitat may occur as a result of implementing Alternative D, the increased visitation expected would also elevate the potential for trampling of herbaceous vegetation by pedestrians, indirectly resulting in long- term, minor adverse effects on these species. The chamomile grapefern is especially susceptible to the damage from trampling and the viability of its populations in the District is monitored by the Park for that reason. The state listed species that may benefit due to increased potential habitat include running bittercress, rough hawkweed, Fraser's yellow loosestrife, broadleaf bunchflower, yellow nodding

lady's tresses, common raven, North American river otter, longhead darter, and northern pine snake.

The hellbender (*Cryptobranchus alleghaniensis alleghaniensis*), is a large aquatic salamander with a state designation of "deemed in need of management" (similar to State Special Concern status for plant species). This salamander is not known to occur at Elkmont, but a population does exist within the Little River, downstream from "The Sinks", a natural waterfall within the Park. As a result, any actions in the District that could impact habitat downstream or water quality within the Little River could indirectly affect the hellbender. Short- term, adverse effects to water quality during construction are expected to be negligible. Following project implementation, expansion of the available area for infiltration should provide minor (D1) to negligible (D2) benefits to water quality, indirectly benefiting aquatic species downstream such as the hellbender.

Although it is not a federally or state- listed species, the synchronous firefly that has been observed in the District would likely benefit from expanded habitat resulting from building removal. However, over the long term, without management to sustain those herbaceous habitats, woody vegetation would eventually encroach upon the area, possibly affecting the synchronism of this species. At this time, the role of synchrony in the ecology of this species is poorly understood, so this impact is difficult to quantify.

In addition, the increase in visitation and internal trips within the District could result in long- term, moderate, adverse impacts to portions of firefly habitat as more grassy areas would be trampled by pedestrians.

4.6.2.4 Wetlands

As described in the No Action Alternative, short- term, direct, minor adverse effects to wetlands would occur during project implementation as a result of disturbance to wetland soils within Millionaire's Row. The environment of the wetlands along Bearwallow Branch is not suitable for machine traffic or even heavy pedestrian traffic due to saturated soil conditions. This disturbance would be temporary and further minimized through seeding of native species over disturbed soils. However, wetlands may experience long- term, minor, indirect benefits from the elimination of chronic disturbances such as those associated with residential properties to be removed within Millionaire's Row.

Implementing Alternative D would also create long- term, minor, indirect benefits by increasing several wetland functions and values, including wildlife habitat, aesthetic/visual quality, flood storage, water quality, fish/shellfish habitat and recreation. Improving the wildlife habitat in areas adjacent to wetlands would increase the wildlife habitat function by providing additional upland habitat and by increasing the botanical diversity. Wildlife species that migrate into areas that were formerly occupied by buildings would utilize wetland habitat nearby as well.

The aesthetic/visual quality value of the wetland would be improved by planting disturbed sites with native plant species. Removal of impervious surfaces (1.64 acres in D1 and 1.17 acres in D2) would allow greater infiltration adjacent to the wetlands, thereby reducing the demand for flood storage. Both the water quality and subsequently, the fish and shellfish habitat functions would improve due to the increased area available for

infiltration and reduced area of pervious surfaces. The recreational value of the wetlands would increase because, for many people, removal of the buildings would make the area more attractive for recreational activities such as fishing and hiking.

4.6.2.5 Water Quality

Implementation of Alternative D could potentially affect water quality due to activities resulting in discharge to surface waters both during and following project completion. Changes to surface water runoff rates and volumes would occur and additional discharge of treated wastewater into the Little River would be required. Potential impacts to water quality resulting from implementation of Alternative D are described below.

Short- term, negligible, adverse effects to water quality could occur during construction as additional ground disturbance takes place during removal of the buildings and installation of water and wastewater distribution pipes. Although Best Management Practices would be followed, there would still be potential for erosion and sedimentation into water bodies to occur during project implementation.

Following construction, long- term minor beneficial effects would result from implementing D1 due to an increase in area available for infiltration (1.64 acres). If D2 was implemented, the long term effects to water quality would also be beneficial, but negligible because there would be an overall net increase of impervious surfaces (0.93 acres).

Sewage Treatment and Pollutant Discharge

Alternative D includes rehabilitation of the Appalachian Club interior for day use, which requires public restroom facilities, temporary housing for visiting scientists in the Wonderland Club cabins and a curatorial facility in the Wonderland Hotel and Annex (if D2 is chosen). The additional wastewater treatment for these improvements, including public restroom facilities for the Appalachian Club, is estimated at 2,268 and 3,635 gallons per day for D1 and D2, respectively. Although these additional daily flows would not stress the hydraulic capacity of the treatment plant, they would increase the erratic diurnal flow pattern with much of the daily flow entering the plant during peak flow times during each day. This would be resolved by the construction of a flow equalization basin at the head of the plant that would receive the daily flow and release it into the plant at a constant rate. This is the only improvement to the wastewater treatment plant necessary to support Alternative D. Water quality standards for Outstanding National Resource Waters would continue to be met because concentrations of contaminants would remain below the water supply maximum contaminant level (See Table 4- 12). There are not any baseline conditions established for thermal loading, other than typical wastewater temperatures of 60 degrees Fahrenheit (see Section 2.2.1); however, the incremental increase in effluent discharge if Alternative D was implemented would be such that temperature effects are expected to be negligible (McGill Associates 2004). The effluent discharge rate would remain the same as the existing condition under all alternatives. At the current rate of discharge, thermal impacts are dissipated entirely within three feet of the discharge pipe due to effluent mixing with cooler water in the pipe from the plant to the discharge point. Because the cooling would continue and the rate of discharge would remain the same under all alternatives, there would be no thermal impacts to the Little River as a result of implementing this alternative (McGill

Associates 2004). Therefore, the wastewater generated by rehabilitation and reuse of the Appalachian Club, some of the cabins and (if D2 is chosen) the Wonderland Hotel and Annex would have no effect on water quality.

The new sewer line to be installed under Jakes Creek to serve the Appalachian Clubhouse would be located above the Little River's confluence with Jakes Creek. The line would be placed in this location to minimize any in- stream impacts to both Jakes Creek and the Little River. Other wastewater components required under Alternative D include additional gravity sewer lines, low pressure sewer force mains, sewage pump station and grinder pumps behind cabins used for temporary housing. Installation of these sewage system components would require additional ground disturbance that would increase the potential for temporary impacts to water quality. However, many of these components would be installed in areas along roadsides that have already been impacted. After vegetation has become reestablished in those areas, the potential for erosion and sedimentation from the ground disturbance would be reduced or eliminated. Therefore, there would be no long- term effect on water quality as a result of installing these wastewater treatment components.

4.6.2.6 Floodplains

Like other alternatives that propose removal of buildings, permanent, indirect, moderate benefits to the 100- year floodplain would be achieved through removal of any impervious surfaces currently in and adjacent to the floodplain of Bearwallow Branch and the Little River. An increase in the area available for flood storage (3,520 sf) would be a direct benefit from removal of three buildings in the floodplain and their associated impervious surfaces. Use of these three buildings (Miller (#46), Faust (#47), and Faust garage (#47A)) that lie within the 100- year floodplain would be contrary to NPS policy that expressly prohibits development within floodplains and would therefore require a formal Statement Of Findings if they were retained. According to Director's Order #77-2, the NPS must "avoid direct and indirect support of floodplain development and actions that could adversely affect the natural resources and functions of floodplains or increase flood risks".

Another direct benefit would be an increase in the area of associated plant communities, such as the montane alluvial forest, that is expected to regenerate at former building sites. Removing buildings in areas adjacent to floodplains would provide indirect benefits by increasing the area available for infiltration. Additional indirect benefits would be created because removal of buildings within and adjacent to floodplains would eliminate the potential for future ground disturbance and soil compaction associated with residential use.

4.6.2.7 Air Quality

As in the No Action Alternative, there would be a temporary increase in emissions under Alternative D due to operation of equipment during project implementation. These direct, adverse effects to air quality would be short- term in duration and negligible, occurring only during construction. These effects could be minimized by reducing equipment idling times, ensuring that all equipment is in good operating condition, and by performing construction during the time of year when ozone is least likely to form (April to September).

Following project implementation, air quality can be affected by increases in vehicular traffic and by how this traffic moves throughout the District. Increased engine idling times will generally occur as traffic congestion causes increases in travel time along roadways, within parking areas, at gates, and at destination points that are visible from the roadway, such as at wayside exhibits. Longer idling times result in increased emissions.

Visitation and internal vehicular trips are expected to rise under Alternative D (see Table 4- 8). The results of an analysis was performed by the Park to evaluate the potential nitrogen deposition and nitrogen dioxide (NO2) impacts from the use of the proposed Appalachian Club and Wonderland Club parking lots show impacts very far below the nitrogen deposition threshold of 0.01 kilograms per hectare per year. The impacts were in the range of one- ten thousands of the nitrogen deposition threshold. The visible haze analysis indicates no visible haze impacts. The maximum impact of nitrogen dioxide to the annual NO2 Class I PSD increment was approximately 0.017 micrograms per cubic meter (ug/m^3), or one- sixth of the EPA Class I significance level (0.1 ug/m^3). A visible plume analysis using the EPA VISCREEN model in the Level 1 mode also indicated that there will not be a visible plume impact from the vehicle emissions.

In an independent air quality assessment performed by McGill Associates based on a busy Saturday in summer, this projected increase in traffic is expected to result in an annual 2.92- ton increase of NOx emissions and a 4.01- ton increase in VOCs emissions in 2015. This increase in VOCs emissions is less than 5 tons per year over the existing condition, resulting in indirect, long- term, minor adverse effects on air quality under Alternative D.

4.6.3 Impacts on Interpretation and Visitor Use

4.6.3.1 Visitor Experience

The direct and indirect effects on visitor experience would be long- term, major, and beneficial, created primarily through removal of buildings, restoration and preservation of others, and installation of cultural and natural resource interpretive media. Most of the cabins would be restored in Daisy Town, allowing visitors to experience most of this section of the District in its historical context. The Chapman (#38) cabin would be restored in Society Hill and a wayside exhibit installed allowing visitors to learn about Colonel Chapman's role in the establishment of the Park. The Spence cabin (#42) in Millionaire's Row would be restored and a wayside exhibit installed. An exhibit in Millionaire's Row discussing the natural history of synchronous fireflies would also be added.

Visitor experience is expected to change considerably as a result of implementing Alternative D. Although removal of some of the buildings and restoration and preservation of others is not expected to significantly change visitor use, there would be a change in the level of interpretive efforts. Providing additional historical information in the Elkmont Nature Trail brochure, the orientation kiosk, exhibits inside the Appalachian Clubhouse, and nine wayside exhibits would likely have a beneficial effect on visitor experience in the District. The visiting public would have the opportunity to learn about the history of the Appalachian and Wonderland Clubs and train stations, the use of Daisy Town as a summer resort area, Colonel Townsend's role in establishment of

Elkmont, and other cultural and natural resources of the District. The exhibits and updating of the trail brochure in Alternative D would allow visitors to understand what they are viewing in the District and to achieve a sense of time and place associated with the buildings. These types of interpretive materials are not currently available throughout the District and their installation is expected to provide long- term, moderate, benefits to the visitor experience.

In addition to these interpretive efforts, the general public would also have the opportunity to participate in structured resource education programs offered by NPS staff. The programs would be free to the public and would focus on natural and cultural history. While the Millionaire's Row and the majority of the Society Hill buildings would be removed, restoration of native plant communities would be undertaken in these areas following construction. Thus, visitors would also have the opportunity to view natural communities and interpret natural succession as well.

4.6.3.2 Visitor Facilities

Visitor facilities would experience long- term, direct and indirect moderate benefits as a result of implementing Alternative D. Although 22 to 24 contributing buildings would be removed under this alternative, a variety of visitor facilities would be added. An orientation kiosk with exhibits, nine wayside exhibits and one interior exhibit would be installed. These exhibits would provide visitors with information on the natural environment and interpret the cultural resources. With the addition of the exhibits and the reconstructed Wonderland Hotel (D2), visitors would gain the ability to understand the history behind establishment of the Town of Elkmont, the history of the Appalachian and Wonderland Clubs and associated train stations, the establishment of the Park and how it affected Elkmont, and to view and learn about the Park's curatorial collection. Exhibits describing the natural and cultural history of the area would be placed strategically to orient visitors as they enter the District and most of the major sections of the District, including the campground.

As a result of implementing Alternative D, additional benefits would be provided by the construction or repaving of up to five parking areas in the District, repaving roadways, and resurfacing or creation of pathways. Some of the areas currently utilized by visitors to park are currently not paved and are eroded, rutted and generally disturbed. Creation of pervious pavement lots would provide a stable surface for parking while preserving the aesthetic quality of the environment expected by the visiting public in a National Park.

In addition, day use and restroom facilities would be provided at the Appalachian Clubhouse under Alternative D. Restroom facilities would also be added at the reconstructed Wonderland Hotel under D2. These modifications would provide a long-term, moderate benefit to visitor facilities.

4.6.4 Impacts on Socioeconomic Environment

Alternative D would have no direct, indirect or cumulative effect on the socioeconomic environment.

4.6.4.1 Population and Environment
Alternative D would have no direct, indirect or cumulative effect on local or regional populations.

4.6.4.2 Land Use
Implementation of Alternative D would indirectly result in long- term, moderate beneficial effects to land use. These effects would be achieved through opening the grounds to the public following removal of some of the buildings and structures and by providing additional opportunities for those uses described in the land use zone designations in the 1982 General Management Plan. Implementation of Alternative D would continue to allow for use of public roadway corridors, accommodations at the existing Park quarters, and picnicking and camping at the Elkmont Campground. Historical and natural resource interpretation would be increased over that which is currently offered through installation of a variety of exhibits, retention of some buildings for interpretive uses, and the Appalachian Clubhouse as a public day use rental facility and self- guiding museum. Housing for visiting scientists would be provided in one portion of the District and, in D2, curatorial storage would be provided at the Wonderland Hotel, fulfilling Park administrative needs.

These uses would be supported by alterations to existing infrastructure, including new parking areas, restroom facilities, and other infrastructure such as electric, sewer and water connections. Internal trips within the District are expected to increase, as is overall visitation to the District (see Tables 4- 6 and 4- 7). However, increased visitor opportunities within the District are not expected to result in land use conflicts (such as traffic congestion, crowding, etc.) if Alternative D is implemented.

4.6.4.3 Access and Circulation
Alternative D proposes moderate intensity of reuse, including temporary housing for visiting scientists only at cabins in one area of the District, interior preservation and exterior restoration of cabins in other areas for use as interpretative exhibits and a curatorial facility at the Wonderland Hotel (if D2 is chosen). During implementation, Alternative D would create short- term, direct, minor adverse effects on access and circulation. Although the buildings and grounds would remain closed during construction to prevent safety hazards to visitors, alternate access to trails in the area may need to be provided. To avoid impacting campground visitors, construction activities would take place when the campground is closed (December to February). These measures would greatly reduce the potential for adverse effects to access and circulation. During removal of the buildings, construction vehicles would add to visitor traffic to and from the District and could cause minor delays due to the reduced capacity for trucks carrying heavy loads to accelerate.

An increase in visitation is expected to occur under this alternative, with total daily vehicle trips increasing from 1,340 in the No Action Alternative to 2,462 and 2,618 in D1 and D2, respectively. Internal pedestrian trips would increase from 431 to 447 in D1 and 479 in D2. A complete comparison of estimated change in volume of trips between alternatives is provided in Tables 4- 6 and 4- 7 at the end of this chapter. To alleviate potential conflicts between vehicles and pedestrians, a number of roadway modifications are included. The potential for pedestrian and vehicle conflicts would be minimized through resurfacing of an overgrown pathway in Daisy Town and relocation of a gate on

Jakes Creek Road to just south of the intersection with Jakes Creek Cemetery Road. Although the potential for vehicle and pedestrian conflicts would still exist, these proposed modifications would provide added safety to visitors, a benefit as compared to the conditions which would remain under the No Action Alternative. However, even with roadway and access modifications, the Level of Service in some areas would be reduced (from A to B). The Level of Service describes operational conditions within a traffic stream, with Level A representing free flow traffic, up to Level F in which traffic delays can be severe. A change from Level A to Level B would result in a decrease in average travel speed, increased percentage of time spent following and reduced headway between vehicles. Therefore, Alternative D would have indirect, long- term, moderate adverse effect on access and circulation.

4.6.5 Impacts on Other Resources

4.6.5.1 Viewshed

Impacts to visual quality consist of changes that would alter or obstruct (1) visible landscape features from dominant viewpoints established as part of this analysis; and (2) access and visibility to dominant or important viewpoints or sequences of viewpoints. The primary viewpoints or sequences of viewpoints within the District that still exist are from existing roadways and trails and buildings. Currently, the building grounds are closed to the public and access to many of the viewpoints within the District is prohibited due to safety concerns related to the condition of the buildings.

The established baseline for this environmental analysis and the associated visual analysis is the No Action Alternative. This baseline identifies a naturally regenerated landscape within the study area as the condition for visual analysis. Buildings within the study area are considered obstructions to the natural viewshed that would be removed if the General Management Plan (the No Action Alternative) was implemented. As a result, long- term, indirect, moderate, adverse effects would be created by retention of most of the Daisy Town buildings, the Appalachian Clubhouse, the Chapman cabin (#38) on Society Hill, and buildings in the Wonderland Club (including the reconstructed Wonderland Hotel and restored / rehabilitated Annex under D2). Although retention of these buildings would adversely affect visual quality by obstructing the natural viewshed, some long- term, minor benefits to visual quality and aesthetics would be realized through removal of the remainder of the buildings in the District and increasing the area available for restoration of native plant communities (photos 3 through 6A in Appendix D depict the existing views of a variety of historic buildings and simulations of the potential views following removal of these buildings). In addition to retention of some buildings, Alternative D proposes to retain foundations, rock walls and other cultural landscape components that also pose a minor obstruction to views of the District's natural resources. Although direct, adverse impacts to visual quality and aesthetics are expected to occur during implementation of Alternative D because of the presence of machinery and ground disturbance, these effects would be short- term and negligible.

The viewshed sensitivity maps shown in the Visual Quality Assessment (Appendix D) indicate the areas visible from a variety of viewpoints throughout the District. The direct effect on the composite viewshed would also be long- term, moderate, and adverse under Alternative D due to retention of some buildings, structures and cultural landscape components. Composite viewshed areas shown (Figures 7, 8 and 9, Appendix

D) would also be adversely impacted by building retention with regard to the area that is visible from the transportation corridors.

4.6.5.2 Soundscape

Direct, short- term, minor adverse effects on the soundscape are expected to occur during implementation of Alternative D due to construction activities. The high noise levels of combustion- powered equipment, particularly due to earth moving equipment (usually diesel), are expected to be the main contributor to the sound levels during construction and can interfere with the ability of individuals near the work site and passersby to hear speech. Peak noise levels from construction as measured at a distance of 50 feet may vary from 70 dBA to 100 dBA. The primary sources of construction noise in this alternative may include removal of buildings, hauling, grading, and paving, as well as noise from restoration and rehabilitation of buildings and construction of new facilities. Overall, construction noise is relatively short in duration and would be restricted to daytime hours at the time of year in which visitation is expected to be the lowest.

Following implementation of Alternative D, future noise levels are expected to remain in the average range of 50 to 60 dBA, with maximum levels (over short periods of time) exceeding 70 dBA for loud vehicles. As in the No Action Alternative, since the average noise levels do not exceed the noise abatement criteria of 67 dBA, Alternative D would not affect noise in the District over the long term.

4.6.6 Impacts on NPS Operations

In addition to removal of historic buildings, Alternative D includes modifications to existing infrastructure, increasing the number of parking lots and paving with pervious pavement, restoration of cabins for use as interpretive exhibits and restoration and rehabilitation of the Appalachian Clubhouse as a public day use rental facility. The Wonderland Hotel would be reconstructed and the Wonderland Annex rehabilitated under D2. All of the new visitor facilities, exhibits and infrastructure would have to be maintained by NPS staff. The effect of implementing Alternative D on NPS operations would be permanent, moderate and beneficial, primarily because the need to stabilize, maintain and police buildings across the District would be largely eliminated, with the exception of the 16 cabins retained in Daisy Town, the Chapman (#38) cabin in Society Hill, the Appalachian Clubhouse, the Spence cabin (#42) in Millionaire's Row, and the six cabins in the Wonderland area. There is cost associated with restoring and preserving the remaining buildings and for maintaining the upgraded infrastructure (i.e. cleaning pervious pavement, maintaining exhibits, etc.). Additional funding and personnel would also be required under D2 to operate the curatorial storage facility. The need for law enforcement may increase slightly as a result of traffic conflicts that could occur with the estimated increases in internal trips within the District. Law enforcement needs are expected to change significantly to the extent that housing and funding for a ranger (level GS- 9) would be required to police the exhibits and curatorial facilities. Costs associated with implementation of Alternative D would be offset to some extent by revenue achieved from rental of the Appalachian Clubhouse as a public day use rental facility.

Some expenditures required for vegetation management adjacent to the buildings would be eliminated as buildings are removed, indirectly creating a permanent, moderate

benefit for NPS operations through a reduction in costs associated with staff time and equipment needs. However, the overall indirect effect on NPS operations due to hazard tree and other vegetation management is expected to be long- term and moderately adverse because most areas of the District and the grounds would be open to the public and would require aggressive vegetation management. Even where buildings are removed, the NPS must still manage vegetation to provide for visitor safety and hazard trees adjacent to exhibits, trails and roadways would continue to be removed as needed to reduce the possibility that visitors could be harmed by falling trees.

4.6.7 Cumulative Effects

The loss of aboveground cultural resources in Alternative D is significant and would result in a permanent, adverse, cumulative effect. While the Park contains a variety of historic buildings and cultural landscape components, the District's buildings represent the only remaining representative group constructed during that period of significance in the Park. Other resort properties representing this time period, such as hotels and lodges inside the Park and hotel and cabin communities outside the Park, have been removed or may no longer retain historic integrity. When added to past actions, implementation of this alternative would cumulatively result in loss of groupings of buildings representing that period in southern Appalachian history.

Beneficial cumulative effects would generally be created by removal of buildings and subsequent restoration of plant communities throughout a portion of the District. The impacts of implementing Alternative D on the 100- year floodplain and wetlands would be primarily limited to the District and the Little River watershed. Some beneficial cumulative effects on wetlands and floodplains would be realized by expanding the area available for flood storage in the watershed. Reestablishment of native plant communities provides multiple benefits to the aquatic and terrestrial environment through soil stabilization and reduction in erosion and sedimentation. Although water quality in the Little River and its tributaries has remained excellent, contributions of sediments from erosion or petrochemicals from parking area runoff can add to the existing load already entering the river system from the high number of visitors to the Park and surrounding gateway communities. Reduction in runoff and elimination of erosion help to lower the potential for contaminants to enter the river. In addition, removal of some of the buildings would allow for reestablishment of the globally imperiled montane alluvial forest.

The increased visitation and internal traffic within the District to view exhibits adversely affects air quality. The effect of increases in NOx and VOC emissions resulting from implementation of Alternative D is very small when compared to overall emissions in the Park and in the region. However, because the entire Park is designated a non- attainment area and a Class I area under the Clean Air Act (the highest level of air quality protection) even a small increase adds to already degraded air quality and constitutes a long- term adverse cumulative effect.

Invasive, non- native plant species thrive in disturbance areas. The spread of these species could be further exacerbated by increased disturbance caused by pedestrian traffic into sensitive areas. Permanent revegetation with native species would create a beneficial cumulative effect by reducing the area available for invasive, non- native species to become established, thereby decreasing the potential for these species to

infiltrate into surrounding areas of the Park. Failing to continue a comprehensive, invasive, non- native species management program at Elkmont Historic District could, over time, result in the spread of those species into other areas of the Park, adding exponentially to the existing adverse effects that invasive species have on the Park's botanical diversity.

4.6.8 Conclusion

Implementation of Alternative D would result in negligible to minor enhancement of the long- term productivity of some natural resources including soils, floodplains, aquatic and terrestrial communities, wetland functional values, habitat for threatened, endangered, rare and sensitive species, and water quality. In general, in D1, the overall long- term productivity of biotic resources would be benefited due to the increase in land available for restoration of native plant communities. This effect would be diminished in D2 due to elimination of potential for native plant community reestablishment at the Wonderland Hotel and Annex sites. Removal of buildings and structures in the portion of the District located within the 100- year floodplain of the Little River would also increase the area available for reestablishment of the globally imperiled montane alluvial forest. However, there would be an irreversible commitment of resources due to elimination of up to 12 acres of potential montane alluvial forest habitat where buildings are retained.

Restored vegetation adjacent to floodplains, wetlands and tributaries would protect water quality of the Little River, an Outstanding National Resource Water. NPS operations would also benefit following implementation of D1 due to the removal of buildings that currently require NPS staff and funding to maintain and stabilize. Additional costs associated with implementation of Alternative D would be offset to some extent by revenue realized from rental of the Appalachian Clubhouse as a public day use rental facility. However, the overall long- term effect to NPS operations would be moderately adverse due to the increase in hazard tree management required to provide for visitor safety throughout the District. Land use would benefit from increased interpretive opportunities, visiting scientist housing and, under D2, the curatorial facility when the District grounds are opened following construction activities.

Cultural resources would also be enhanced as direct, long- term minor to major beneficial effects would result by retaining, restoring and preserving some historic buildings including the Appalachian Clubhouse, the 16 Daisy Town cabins, the Spence (#42) and Chapman (#38) cabins, six cabins in the Wonderland Club, and by retaining some of the District's cultural landscape characteristics and features. Reconstruction of the Wonderland Hotel and rehabilitation of the Annex under D2 would provide direct benefits to cultural resources and to visitor use facilities. Treatment of the retained buildings in accordance with *The Secretary's Treatment Standards* would create a beneficial effect, as would the restoration and preservation of one noncontributing cabin (Swan (#4)) to make it contributing element. Retention of these features would also provide more opportunities for cultural resource interpretation and curatorial storage and display.

The expanded interpretive opportunities, providing access to trails and exhibits, and correction of erosion problems at culverts are all beneficial effects. Other areas that would benefit from Alternative D are visitor facilities and visitor experience.

Irretrievable commitments of resources would result if Alternative D is implemented. These commitments would be created primarily by removal of almost one half of the contributing buildings and would constitute a direct, permanent, major, adverse effect to aboveground cultural resources within the District and loss of cultural landscape characteristics and features (mainly "spatial organization" and "buildings and structures"; see Table 3- 3). In addition, this alternative would result in a change in the use and setting of the District and cultural landscape. Indirect, minor, adverse effects on the District and landscape would include wear and tear on features in the Appalachian Clubhouse and other interpretive features in Daisy Town and at the Chapman cabin (#38) due to increased internal trips to view exhibits.

Alternative D would create direct, major, permanent adverse effects to a portion of the cultural resources. There is also potential for irreversible impacts to archeological resources as a result of implementation of these alternatives, but it is possible that those effects could be eliminated or minimized through proper planning and avoidance measures.

Some unavoidable adverse impacts associated with implementing Alternative D are direct, short- term, and negligible and would affect soils, biotic communities, noise, air quality, visitor experience, visitor use, access and circulation, and aesthetics and viewsheds. These effects would be caused primarily by ground disturbance during installation of water lines, sewer lines, and parking areas; increased erosion potential; increases in noise and emissions from construction equipment; and the short- term, adverse effects on visual quality and aesthetics during and immediately following construction, prior to reestablishment of vegetation in disturbed areas.

Additional costs to NPS operations would be required for staffing and maintenance of the curatorial facilities (under D2), maintenance of the visiting scientist housing, and additional law enforcement to deal with the impacts of increased visitation.

4.7 Impacts of Alternative E

Alternative E entails the retention of 16 cabins and the Appalachian Clubhouse in Daisy Town, the Chapman cabin (# 38) in Society Hill, six cabins and one garage in Millionaire's Row, seven cabins in the Wonderland Club, and removal of all other historic buildings in the District, either by mechanical means or by hand. Foundations, chimneys, stone walls, and other cultural landscape features would remain in place wherever they would not pose a safety hazard to visitors. In addition, E2 proposes reconstruction of the Wonderland Hotel and rehabilitation of the Annex for public lodging.

Overall, day- use visitation as a result of implementing Alternative E is expected to increase by an average of 26 visitors per day (see Table 2- 20), plus up to 22 visiting scientists and 57 guests utilizing overnight lodging (109 guests for E2). The length of an average daily visit is also expected to increase due to the opportunities provided by day use of the Appalachian Clubhouse, the walking tour through Daisy Town, the various exhibits throughout the District, visiting scientist housing in Millionaire's Row, and public lodging in the Wonderland cabins. Public lodging would also be provided in the reconstructed Wonderland Hotel and rehabilitated Annex under E2. Existing recreational use would continue to occur. New exhibits are proposed under this alternative and the Elkmont Nature Trail brochure would be updated to include natural and cultural information on Elkmont. The Park would continue to implement its existing natural resource management activities.

Some changes to parking and circulation within the District would be required. Once this work was completed, a moderate increase in operation and maintenance expenditures would be required beyond what the Park already budgets for the roads, parking, water and wastewater systems, and operations and staffing.

4.7.1 Impacts on Cultural Resources

Buildings and Cultural Landscape

Implementation of Alternative E would result in direct, permanent, moderate, adverse effects to the aboveground cultural resources of the District, due to removal of 19 contributing buildings under E1 or 17 contributing buildings under E2. Depending on the option selected within this alternative, 30 or 31 contributing buildings, including the Appalachian Clubhouse, would be retained under Alternative E, and a reconstructed Wonderland Hotel and a restored/rehabilitated Annex could be utilized if E2 is chosen. The majority of Elkmont's cultural landscape features and the overall District setting would be retained under this alternative.

Of the 19 contributing buildings proposed for removal under E2, 17 buildings were listed as "Poor" or "Fair to Poor" condition in 2003. Of these same 17, two –the Wonderland Hotel and Cabin #36 –have significant portions that have collapsed and at least three other cabins have significant problems with structural integrity.

The cultural landscape characteristics and features of Elkmont, such as the historic swimming hole at Little River, stone walls and a footbridge over Bearwallow Branch, would be retained under this alternative as would eligible cultural landscape features. The preservation of the retained cabins, the rehabilitation of the clubhouse, and if E2 is

implemented, the reconstruction of the Wonderland Hotel would be conducted in accordance with *The Secretary of the Interior's Treatment Standards*.

New visual elements would be introduced into the District, such as the orientation kiosk, ten wayside exhibits, the four parking areas (six if E2 is chosen), the paths and roads, a replacement bridge (if E2 is chosen), the pumping station access hatches and one electrical control panel, the well house, the flow equalization basin and the stream bank stabilization work at the eroded culverts.

Indirect, long- term, moderate, adverse effects on the District would result from the projected increase in visitation and traffic congestion, along with wear and tear from increased pedestrian traffic at the Appalachian Clubhouse, the Wonderland Hotel and Annex, the Wonderland cabins, the visiting scientists' temporary housing at Millionaire's Row, and, potentially, at the porches of the retained Daisy Town buildings and the Chapman cabin (#38).

Long- term beneficial effects would include retention of the Appalachian Clubhouse as a public day use rental facility and self- guiding museum, 16 Daisy Town cabins, Chapman cabin (#38), six cabins and one garage on Millionaire's Row, and the seven Wonderland cabins; reconstruction of the Wonderland Hotel, (as a contemporary re- creation of the original building) and restoration and rehabilitation of the Annex (if E2 is chosen); and retention of most of the District's cultural landscape characteristics and features. Restoration, rehabilitation, preservation, and reconstruction of the retained buildings in accordance with *The Secretary's Treatment Standards* would provide a direct, long- term, minor to major beneficial effect, as would the restoration of one noncontributing cabin (Swan (#4)) to a point within the period of significance based on available documentation.

The interpretive exhibits, parking areas, new paths and roads, a replacement bridge, and stream bank stabilization at eroded culverts would create minor, adverse effects on cultural resources. The proposed new elements would constitute a minimal visual change District- wide. In addition, the proposed parking areas, paths, roads, and bridge would be located in areas already visually impacted by existing roads, paths, parking areas, and a noncontributing bridge.

The proposed utility lines would be buried in the ground, thereby removing intrusive power poles that postdate the period of significance. The belowground pumping stations would not be visible, except for small access hatches placed flush with the ground. The pumping station behind the Wonderland Hotel would have an aboveground electrical control panel roughly two to three feet tall surrounded by a security fence. These minor elements would be designed to be as unobtrusive as possible. The proposed well house would be small in size and located away from the District buildings in an area where it could be screened. The proposed flow equalization basin upgrade to the wastewater treatment plant would be located at the edge of the District adjacent to the modern wastewater treatment plant, in an area visually removed from the District's buildings.

The long- term, indirect effects on the District and its landscape caused by the increase in visitation and traffic congestion, as well as wear and tear on buildings and landscape

features, could reach the level of adverse effect, due to the numbers of visitors and vehicles projected and the more intensive use proposed for many of the buildings and features slated for retention.

Archeological Resources

As with all alternatives, the potential for Alternative E to impact archeological resources depends on the level, extent and location of ground- disturbing activities. This alternative proposes removal of fewer buildings than the No Action Alternative. However, installation of sewer, water, and electrical lines, parking area construction and paving activities would result in additional ground disturbance that could affect archeological resources. These impacts would be direct, permanent, and could be major. In addition, there is the potential for increased visitation and pedestrian traffic to result in site erosion following trampling of the plant cover. Additional site erosion could result in disturbance to shallowly–buried archeological deposits. These impacts would be indirect, permanent and could potentially be minor to moderate. The areas where archeological resources could potentially be adversely affected include one locus where significant resources have been documented, seven loci where potentially significant resources have been identified, and two areas that have not yet been surveyed. There would be no effect on potentially significant resources at nine loci.

Compared to the No Action Alternative, Alternative E includes three additional loci where potentially significant resources have been identified and could be adversely affected by installation of the Little River Trail and Wonderland Hotel parking areas, and installation of sewer and water lines. The ultimate impacts to archeological resources due to project implementation would depend on the outcome of additional investigations. NPS staff would continue established resource protection measures for the identification and treatment of archeological resources on a case- by- case basis. The proper execution of avoidance or protective strategies could ensure that no effect on archeological resources would occur.

Section 106 Determinations

Under Section 106 of the National Historic Preservation Act, the removal of 17 to 19 contributing buildings within the NRHP listed Elkmont Historic District would constitute an adverse effect. The potential effects to archeological resources under Alternative E could also result in a determination of adverse effect.

All mitigation will be determined through formal consultation with the Tennessee State Historic Preservation Office, the Advisory Council on Historic Preservation and the Chickasaw Nation and Eastern Band of the Cherokee Indians Tribal Historic Preservation Officers. The exact type (s) and cost of the mitigation cannot be calculated at this time.

4.7.2 Impacts on Natural Resources

Impacts to natural resources due to implementation of Alternative E would result primarily from the greater development, intensity of use and increased activities within the District. Immediate impacts to natural resources would result from ground-disturbing activities associated with building removal and infrastructure modifications.

Additional long- term impacts would result from increases in visitation, pedestrian traffic and associated activities. These effects are discussed below for each natural resource.

4.7.2.1 Soils

E1 proposes removal of a total of 42 buildings within the District (40 if E2 is chosen). As a result, adverse effects on soils would occur during project implementation if the use of heavy machinery and other equipment is necessary for the removal of the buildings. Short- term, moderate, adverse effects to soils would occur as a result of installation of new water and sewer lines, underground utility lines, road repair and construction of pathways. All of these activities would require either excavation or grading, resulting in adverse effects to soils over a wider area in the District than in the No Action Alternative. Impacts occurring during construction would be mitigated by protocols established by the Park to minimize impacts to soils and the adverse effects on soils due to project implementation activities would be temporary.

Additional activities required under Alternative E that would directly adversely affect soils include construction of four parking areas (plus two additional parking areas if E2 is selected), installation of water, sewer and electrical lines, and force mains to service the Wonderland Hotel and Annex (if E2 is selected) and cabins, expansion of the wastewater treatment plant, road repairs and minor widening, installation of paths, and installation of a new bridge across the Little River (E2 only). All of these activities would cause additional ground disturbance and result in adverse effects to soils over a wider area in the District than the No Action Alternative. For some activities, such as sewer and water line installations, the adverse effects would be temporary. The new bridge construction across the Little River is of particular concern due to the presence of flowing water. Although Best Management Practices would be followed to minimize adverse effects, any construction within a stream channel would likely cause a temporary increase in erosion and sedimentation into the river. As vegetation is reestablished, the erosion rate would decline and adverse effects on soils would be diminished in those areas where infrastructure components are installed.

Impervious surfaces would be eliminated when the buildings are removed (1.44 acres in E1 and 0.97 acres in E2). Subsequently, additional area would be available for surface water infiltration and runoff quantities would decrease in those areas, providing long-term, moderate, beneficial effects to soils. Once vegetation is reestablished in areas formerly occupied by buildings, the plants would supply additional protection from erosion by preventing rain from falling directly on bare soils and by stabilizing soils with their root systems. The beneficial effects provided by the vegetation would increase as the plants mature.

Although impervious surfaces would be removed in some areas under this alternative, in other areas, impervious surfaces would be added by the paving of roads and parking areas. In addition, since the number of visitors is expected to increase and the estimated increase in internal pedestrian trips is likely to be considerable (see Table 4- 7), additional incremental impacts would occur due to soil compaction and related impacts to plants from trampling.

An additional 1.5 acres (E1) and 3.0 acres (E2) are proposed to be covered with pavement. Pervious concrete would be used in parking areas and some infiltration is possible where

this material is used. Although the surface would produce higher rates of runoff than undisturbed, vegetated surfaces, these effects are expected to be moderate following implementation of E1, with a 5.6 percent increase over the existing condition. Runoff would increase by approximately 6.9 percent under E2. This increase in runoff could cause additional soil erosion and subsequent sedimentation of surface waters and result in indirect, long- term, moderate, adverse effects on soils. Sediment loading would result in degradation of water quality due to contamination of runoff with petrochemicals and other contaminants from automobiles.

4.7.2.2 Biotic Communities

4.7.2.2.1 Terrestrial Plant Communities

Implementing Alternative E would result in major impacts to plant communities within the study area, primarily as a result of effects to the G2 ranked, "globally imperiled" Southern Appalachian montane alluvial forest habitat. Retention of buildings throughout the District would require hazard tree removal, beyond that which is currently conducted adjacent to trails and within the Elkmont Campground. This necessary activity, in addition to the physical presence of individual buildings and the associated infrastructure, would severely disrupt plant community dynamics within the District.

Initial vegetation management would be aggressive adjacent to retained buildings. Subsequent annual maintenance of the perimeter around historic structures would continue to be intensive, permanently preventing old growth forest structure from developing. Because the grounds would be open to the public and buildings would be retained throughout the District in Alternative E, a significant amount of vegetation management would be required. At each remaining building, and at exhibits and trailheads, hazard tree removal and vegetation management would be needed.

These direct adverse impacts are expected to be long- term and major, and would occur over a larger area in this alternative than in previously discussed alternatives because more buildings are retained. Adverse effects would be incrementally greater if E2 is implemented due to retention of the Wonderland Hotel and Annex. Increased pedestrian and vehicular traffic would also create long- term, indirect negative major impacts on biotic communities.

In Millionaire's Row, Daisy Town and the Wonderland Club, the majority of the buildings are proposed to be retained, eliminating the potential for expansion of plant communities in those areas. The retention of buildings and the associated activities within the Little River floodplain in the area known as Millionaire's Row would result in a reduction in the opportunity for reestablishment of the globally imperiled montane alluvial forest.

Removal of the buildings in the area of the District known as Society Hill would allow a variety of plant community types to increase. In Society Hill, forested areas have experienced considerable disturbance due to past human activity. Plant communities present include early successional Appalachian hardwood forest, dominated by tulip tree and red maple, with smaller areas of Appalachian

montane oak- hickory, southern Appalachian cove, and Virginia pine successional forest communities. Removal of the buildings would allow for expansion of these communities and succession to hardwood forest.

Short- term, moderate, direct adverse effects to biotic communities are expected to occur during construction as well as indirect, long- term adverse impacts following project implementation. During construction, excavation would disturb vegetation and most likely require removal of smaller trees and root masses. The possible use of heavy equipment for removing buildings along with the vehicular and pedestrian traffic would likely cause temporary disturbance of plant communities. Under E2, the activities required for reconstructing the Wonderland Hotel and providing access to it and the Annex would require ground disturbance for installation of sewer, water and electrical lines, and paving of parking areas. Following construction, the expected increase in visitation, and the increase in pedestrian traffic would further increase the stress on plant communities and wildlife habitat.

Although wildlife habitat could be expanded through removal of buildings, under Alternative E, the area available would be relatively small and the habitat may not be suitable for a wide variety of species that cannot tolerate the presence of humans and their vehicles. Visitation is expected to increase as compared to the No Action Alternative and the higher visitation rate would be accompanied by a proportional increase in the improper storage and disposal of food items. Food brought into day use areas and garbage attracts wildlife, increasing the potential for human – wildlife encounters. Encounters with black bears, raccoons and even small rodents can be dangerous for both the human and the wildlife species involved. Increased traffic would also increase the potential for vehicular collisions with wildlife. These indirect, adverse effects on wildlife would be minor because they affect individuals and not entire populations.

4.7.2.2.2 Aquatic Communities

Direct, short- term, negligible, adverse effects to aquatic communities could result during implementation of Alternative E. These effects would occur during project implementation, primarily due to the ground disturbance, potential erosion, and runoff into surface waters that could occur following the use of heavy equipment. Installation of sewer, water, power, and phone lines will all result in temporary disturbance within and adjacent to the floodplain of the Little River. Protocols for project operations and impact avoidance measures have been developed by the Park to minimize the potential for adverse effects to biotic communities (see Section 2.2.1). Even with incorporation of these measures, the nature of the work may result in unavoidable, yet negligible discharges of sediment into aquatic environments.

The overall indirect effect to aquatic resources in the District would be minor, long- term, and adverse, resulting from an increase in impermeable surfaces and associated runoff into surface waters. Increased visitation will result in trampling of vegetation and loss of soil stability. Increased traffic and parking will result in deposition of petrochemicals, which, when mixed with rainfall runoff, can result in contamination into adjacent aquatic systems.

4.7.2.3 Threatened, Endangered, Rare and Sensitive Species

Alternative E would have no direct effects on federal- listed threatened or endangered species, since none are known to occur within the proposed project implementation area. A state threatened species, butternut, and two State Special Concern species, Fraser's sedge (*Cymophyllus fraserianus*) and chamomile grapefern (*Botrychium matricariifolium*), also occur within the District. Because many of the buildings would be retained under Alternatives E, and visitation is expected to increase following project implementation, increases in suitable habitat for threatened, endangered, rare and sensitive species are expected to be negligible. Due to the increased visitation expected under Alternative E, the potential for trampling of herbaceous vegetation by pedestrians would also be elevated, indirectly resulting in long- term, minor adverse effects on these species. The chamomile grapefern is especially susceptible to the damage from trampling and the viability of its populations in the District is monitored by the Park for that reason.

The hellbender (*Cryptobranchus alleghaniensis alleghaniensis*), is a large aquatic salamander with a state designation of "deemed in need of management" (similar to State Special Concern status for plant species). This salamander is not known to occur at Elkmont, but a population does exist within the Little River, downstream from "The Sinks", a natural waterfall within the Park. As a result, any actions in the District that could impact habitat downstream or water quality within the Little River could indirectly affect the hellbender. Short- term, adverse effects to water quality during construction are expected to be minor. Following project implementation, increased impervious surfaces and associated runoff could result in minor adverse effects to water quality and could affect aquatic species downstream, such as the hellbender.

Although it is not a federally or state- listed species, the synchronous firefly that has been observed in the District could benefit from expanded habitat as well; however, retention of most of the buildings, with the exception of those in Society Hill, would prevent a substantial increase in grassy habitat from occurring following project implementation. Increased visitation and use could potentially result in long- term, moderate, adverse effects on synchronous firefly populations in the District.

Overall, the long- term, indirect effects on threatened, endangered, rare and sensitive species are expected to be moderately adverse due to impacts on existing and potential habitat.

4.7.2.4 Wetlands

No direct impacts to wetlands would occur as a result of implementing Alternative E. However, wetlands may experience long- term, minor, indirect adverse effects created by retention and use of adjacent buildings, such as those found in Millionaire's Row. The environment surrounding residential buildings is subject to runoff from impervious surfaces, soil compaction, deposition of petrochemicals, planting of non- native species and vegetation management. These types of chronic disturbances tend to result in loss of native plant diversity and subsequent degradation of wildlife habitat.

Several wetland functions and values would be somewhat diminished, including wildlife habitat, aesthetic/visual quality, flood storage, water quality, and fish/shellfish habitat.

The wetlands adjacent to Bearwallow Branch in Millionaire's Row would be most susceptible to these effects.

4.7.2.5 Water Quality

Water quality can be affected by a variety of activities resulting in discharge to surface waters both during and following project implementation. Alternative E would result in changes to surface water runoff rates and volumes and would require additional discharge of treated effluent into the Little River. Potential impacts to water quality resulting from implementation of these alternatives are described below.

Alternative E proposes a more intense use of the buildings across most of the District, with the exception of Society Hill. During the project implementation period, construction activities would have the same effects as described in previous alternatives in that many areas would experience ground disturbance due to the use of heavy equipment and the movement of construction vehicles to and from the areas containing the buildings. Although Best Management Practices would be followed, there would still be potential for sedimentation to occur during project implementation, resulting in short- term, minor adverse effects to water quality. Once the areas are planted and native vegetation has become established, some of these effects would be mitigated.

Retaining more buildings in this alternative would increase runoff because more impervious surfaces would remain. In addition, 1.5 and 3.0 acres would be paved for construction of parking areas under E1 and E2, respectively. A 5.6 percent increase in runoff over the No Action Alternative is expected to occur following implementation of E1. The increase in runoff associated with E2 is estimated at 6.9 percent. Therefore, the long- term, indirect effects on water quality due to increased runoff and potential increase in erosion would be adverse and minor.

Sewage Treatment and Pollutant Discharge

Alternative E includes rehabilitation of the Appalachian Club interior for public day use rental, which requires public restroom facilities, rehabilitation of some of the cabins in the Millionaire's Row area for visiting scientist temporary housing and some in the Wonderland Club for public lodging. In addition, if E2 is chosen, reconstruction of the Wonderland Hotel and Annex for lodging would be added as well. The additional wastewater treatment capacity for improvements necessary under E1 and E2 is estimated at 5,888 and 14,375 gallons per day, respectively. Although the additional daily flows for E1 would not stress the hydraulic capacity of the treatment plant, they would increase the erratic diurnal flow pattern with much of the daily flow entering the plant during peak flow times during each day. This would be resolved by the construction of a flow equalization basin at the head of the plant that would receive the daily flow and release it into the plant at a constant flow. This is the only improvement to the wastewater treatment plant necessary to support E1.

The additional daily flows for E2 would cause the total projected peak flow to exceed the current capacity of the wastewater treatment plant. Because treated wastewater is discharged into the Little River, which has been designated an Outstanding National Resource Water, the discharge must not add any additional pollutants to the river or degrade the current water quality. In addition, because the State of Tennessee's environmental regulations prohibit expansion of the hydraulic capacity of the existing

plant, the additional wastewater treatment would have to occur at an alternate location, either through addition of a drip irrigation system located in a suitable area outside of the District or by piping the wastewater to the nearest treatment plant in Gatlinburg.

If either of these methods outlined under E2 were utilized, a separate investigation of the potential resource impacts associated with construction these systems would be required prior to implementation. Water quality standards for Outstanding National Resource Waters are expected to continue to be met at the Elkmont wastewater treatment plant because concentrations of contaminants would remain below the water supply maximum contaminant level at that location (See Table 4- 12). Since water quality standards for Outstanding National Resource Waters would continue to be met, no long- term effects to water quality would result from increased wastewater discharge under E2.

There are not any baseline conditions established for thermal loading, other than typical wastewater temperatures of 60 degrees Fahrenheit (see Section 2.2.1); however, the incremental increase in effluent discharge if E1 or E2 was implemented would be such that temperature effects are expected to be negligible (McGill Associates 2004). The effluent discharge rate would remain the same as the existing condition under all alternatives. At the current rate of discharge, thermal impacts are dissipated entirely within three feet of the discharge pipe due to effluent mixing with cooler water in the pipe from the plant to the discharge point. Because the cooling would continue and the rate of discharge would remain the same under all alternatives, there would be no thermal impacts to the Little River as a result of implementing this alternative (McGill Associates 2004). Therefore, the wastewater generated by rehabilitation and reuse of the Appalachian Club, some of the cabins and (if E2 is chosen) the Wonderland Hotel and Annex would have no long- term effect on water quality through discharge of additional wastewater.

Wastewater components required under E1 include sewer lines, low- pressure sewer force mains, a sewage pump station and grinder pumps behind cabins used for public lodging and for visiting scientists. Installation of these sewage system components would require additional ground disturbance that would result in short- term erosion. However, many of the sewer pipes would be installed in areas along roadsides that have already been impacted and when vegetation has become reestablished in those areas, the potential for erosion and sedimentation from the ground disturbance would be eliminated. To cross streams, pipelines have been planned to be suspended under bridges rather than be placed under the streambed. Where lines cannot be hung from bridges, they would be bored under the streambed, avoiding the potential for disturbance to the stream substrate and potential impacts to water quality. Therefore, there would be no long- term, adverse effect on water quality due to the installation of pipes and other wastewater treatment components.

4.7.2.6 Floodplains

Direct, short- term, minor, adverse effects on the 100- year floodplain are expected to occur during construction as a result of implementing Alternative E. Most buildings in Millionaire's Row would be retained, including three that lie within the 100- year floodplain limits. Use of these three buildings ((Miller (#46), Faust (#47) and Faust garage (#47A)) that lie within the 100- year floodplain would be contrary to NPS policy

that expressly prohibits development within floodplains and would therefore require a formal Statement Of Findings if this alternative would be implemented. According to Director's Order #77- 2, the NPS must "avoid direct and indirect support of floodplain development and actions that could adversely affect the natural resources and functions of floodplains or increase flood risks".

As part of the cabin rehabilitation process, utility services would be connected to the cabins. Although these services would be installed below ground and would not occupy floodplain storage following construction, the vegetation and soils would be extensively disturbed as the lines are installed. Soils adjacent to Bearwallow Branch are composed of Spivey soils. These soils have a high organic content and, as such, are very susceptible to damage from vehicular traffic. As a result, extensive restoration of the floodplain of Bearwallow Branch to stabilize the streambank and reestablish vegetation would be required if Alternative E was implemented. In addition, work to restore and rehabilitate buildings in Millionaire's Row would eliminate the possibility of additional regeneration of the montane alluvial forest as well.

One building will be removed (Young (#48)), resulting in permanent, but negligible benefits due to the removal of impervious surfaces. Additional indirect benefits would be provided because removal of buildings adjacent to the floodplain would eliminate future ground disturbance and soil compaction associated with residential use and would increase the area available for infiltration; however, this effect is expected to be negligible in terms of floodplain function.

Implementation of Alternative E would indirectly create a permanent, minor, adverse effect on floodplains by increasing the amount of impervious surfaces and the erosion potential throughout most areas of the District. The parking areas, roadway improvements, and soil disturbance required to implement the portions of Alternative E that would accommodate the expected increase in visitation, and the visitation itself, would be detrimental to most native plant communities that allow for soil stabilization and precipitation infiltration. This effect would be most evident in Millionaire's Row, which was constructed around the floodplain of Bearwallow Branch. If the cabins retained in this area are utilized for temporary housing, disturbance would occur both during and following project implementation in the form of heavy equipment, and vehicular and pedestrian access.

4.7.2.7 Air Quality

As in the No Action Alternative, there would be a temporary increase in emissions under Alternative E due to operation of construction equipment during project implementation. Direct, adverse effects to air quality during construction would be short- term and negligible. These effects could be minimized by reducing equipment idling times, ensuring that all construction equipment is in good operating condition, and by performing construction during the time of year when ozone is least likely to form (April to September).

Visitation to the District is expected to rise following implementation of Alternative E. Air quality can be affected by the accompanying increases in vehicular traffic and by how this traffic moves throughout the District. Increased engine idling times will generally occur as traffic congestion causes increases in travel time along roadways, within parking

areas, at gates, and at destination points that are visible from the roadway, such as at wayside exhibits. As a result, projected increases in visitation would be accompanied by a lower level of service on roadways servicing the District and more emissions.

The results of an analysis was performed by the Park to evaluate the potential nitrogen deposition and nitrogen dioxide (NO2) impacts from the use of the proposed Appalachian Club and Wonderland Club parking lots show impacts very far below the nitrogen deposition threshold of 0.01 kilograms per hectare per year. In an independent air quality assessment performed by McGill Associates based on a busy Saturday in summer, the projected increase in traffic is expected to result in an annual 6.57- ton increase in NOx emissions and a 9.49- ton increase in VOCs emissions in 2015. Under Alternative E, the increase in emissions for both pollutants is greater than 5 tons per year over the existing condition, indirectly resulting in long- term, major, adverse effects on air quality in the District. A comparison of emissions for the alternatives is provided in Table 4- 8 at the end of this chapter.

4.7.3 Impacts on Interpretation and Visitor Use

4.7.3.1 Visitor Experience

Visitor experience is expected to change significantly as a result of implementing Alternative E. Adverse effects on visitor experience would occur during project implementation. These effects would be created by increased traffic, noise, dust and potential delays in circulation caused by movement of construction equipment. Although project implementation operations would adversely affect visitor experience, this effect is expected to be short- term and negligible.

The long- term indirect effects on visitor experience following project implementation would be both beneficial and adverse. Long- term, major beneficial effects would result from creation of additional visitor facilities and interpretive features. Public lodging would be provided in Alternative E. The Wonderland Club cabins are proposed for public lodging in both options of Alternative E. Under E2, the Wonderland Hotel would be reconstructed and the Annex restored and rehabilitated for use as public lodging and food service. The public lodging and an educational program option would be operated by a private concessioner. The program would provide opportunities to guests staying in the Wonderland Hotel, Annex and cabins to experience recreation and education- based programs within the District and the Park. These programs may include such items as guided back- country expeditions, and cultural resource education- based opportunities. Temporary housing for visiting scientists would be provided at cabins in Millionaire's Row.

Sixteen cabins would be restored in Daisy Town, allowing visitors to experience most of this section of the District in its historical context. The Chapman (#38) cabin would be restored in Society Hill, allowing visitors to learn about Colonel Chapman's role in the establishment of the Park. While the majority of the Society Hill buildings would be removed, restoration of native vegetation would be performed in these areas following construction. Visitors would also have a limited opportunity to view natural communities.

Providing additional historical information in the Elkmont Nature Trail brochure, installation of exhibits inside the Appalachian Clubhouse and Spence (#42) cabin, the orientation kiosk and up to 10 wayside exhibits would create a long- term, major, beneficial effect on visitors' experience in the District.

However, visitor experience would also be indirectly adversely impacted under Alternative E, primarily due to the effects of a considerable increase in visitation. The exhibits, improved infrastructure, lodging and educational opportunities offered under both options of Alternative E would create user demand conflicts, such as those associated with traffic congestion and traffic safety hazards, increased deterioration of cultural and natural resources due to pedestrian and vehicular traffic, diminished air quality, and a change in noise throughout the District. Although noise levels are not expected to reach the level of adverse impact under any alternative, the anticipated trips to, from, and within the District would be accompanied by the sounds of vehicles and a higher number of visitors. The increased visitation projected under Alternative E would also result in a long- term, major adverse effect on the visitor experience within the Elkmont Campground for the same reasons.

4.7.3.2 Visitor Facilities

Visitor facilities would experience long- term, major, direct and indirect benefits as a result of implementing Alternative E. Most of the historic buildings throughout the District, with the exception of the Society Hill buildings would be retained for a variety of use. A total of 10 wayside exhibits and an orientation kiosk with exhibits would be installed under this alternative. These exhibits would provide visitors with information on the natural environment and interpret the cultural resources and the cultural landscape, while providing a historic perspective on prominent figures in Elkmont and the Park's history. With the addition of the exhibits, visitors would gain additional opportunities to understand the history behind establishment of the Town of Elkmont, the history of the Appalachian and Wonderland Clubs and train stations, the establishment of the Park and how it affected Elkmont, and the Park's natural environment. Exhibits describing the natural and cultural history of the area would be placed strategically to orient visitors as they enter the District and most of the major sections of the District, including the campground.

Like previous alternatives, additional benefits would be provided by the construction or repaving of four (E1) or six (E2) parking areas in the District, minor repaving of several roads, construction of walking paths and restoration of the Appalachian Clubhouse, including restroom facilities and interior exhibits, for day use. Some of the areas in which visitors currently park are not paved and are eroded and rutted. Creation of pervious pavement lots would provide a stable surface for parking while preserving the aesthetic quality of the environment expected by the visiting public in a National Park.

The Wonderland Hotel lodging operations would be operated by a concessioner if E2 was implemented. In addition to lodging, Hotel guests would have the option of dining at the Hotel and this service would be extended to all persons staying overnight in the cabins as well. As previously discussed, the concessioner would also provide educational opportunities which would be made available to the hotel and cabin guests as part of their lodging fee. While these proposed opportunities at the Wonderland Hotel would provide a direct benefit to visitor facilities, the NPS is required to first examine whether

this is a necessary and appropriate use for facilities within a National Park (see discussion provided in Section 4.7.8). In addition, the decision regarding whether or not to reconstruct the hotel must follow Department of Interior guidelines. Both management policies reiterate that reconstruction can only occur upon specific written approval by the Director after a policy review at the Washington office level. If reconstruction is chosen, it would have to be undertaken in accordance with *The Secretary's Treatment Standards*, and the building would retain its status as contributing to the District even though it would not retain the historic integrity of its fabric nor its authenticity (NPS 2000).

4.7.4 Impacts on Socioeconomic Environment

Alternative E would have no direct, indirect or cumulative effect on the socioeconomic environment.

4.7.4.1 Population and Environment

No direct or indirect effects on population and environment would result from implementation of Alternative E. As discussed in Section 3.4, the top local industry category includes businesses that have close ties to tourism. Recreation, accommodation and food service industries supply important service to visitors to the Park. Sevier County is one of the most popular vacation locations for people traveling within the United States. In 2003, the number of guest rooms available in Sevier County was 25,289 with hotel and motel rooms comprising 68 percent of the total. The market has indicated steady growth in cabin and condominium rentals as well (Lodging Resources, Inc. 2004).

Gatlinburg, as a gateway community, is the destination for lodging chosen by many visitors to the Park and visitation to Gatlinburg mirrors the trend of visitation to the Park. Elkmont is located in Sevier County, Tennessee. Sevier County has an estimated population of 73,703, which represents an approximate increase of 39 percent from 1990 to 2000. This increase in population is also reflected in the increased visitation to the Park and the District as well. During the past 30 years, the average number of annual visits attributed to the District has been approximately 350,000. In 2001, annual visitation to the District was approximately 375,000. Projections for visitation to the District range from a low of 409,852 in 2006 to a high of 459,023 in 2015 based on the current condition, irrespective of the alternative selected for the District (Table 3- 19). Considering the increase in visitation to the area, it is logical to conclude that additional lodging and food service accommodations would be required in the area in future years. As a result, there would be no effect on existing local populations as a result of implementing an alternative that includes pubic lodging, as is proposed in Alternative E.

4.7.4.2 Land Use

Implementation of Alternative E would directly result in long- term, moderate adverse effects to land use. These effects would occur through opening the grounds to the public following removal of some buildings and structures, retention of a large number of buildings for public lodging and by providing a variety of additional opportunities for those uses described in the land use zone designations in the 1982 General Management Plan that would result in an increase in the visitation to the District and the internal trips within the District (see Tables 4- 6 and 4- 7). Implementation of Alternative E would continue to allow for use of public roadway corridors, accommodations at the existing Park quarters, and picnicking and camping at the Elkmont Campground. Historical and

natural resource interpretation would be increased over that which is currently offered through installation of a variety of exhibits, retention of some buildings for interpretive uses and the Appalachian Clubhouse as a public day use facility and self- guiding museum. Public lodging would be provided in cabins in some portions of the District and, if E2 is implemented, also at the Wonderland Hotel and Annex. Visiting scientist housing would also be provided in Millionaire's Row under both E1 and E2.

These uses would be supported by alterations and additions to existing infrastructure including new parking areas, restroom facilities, electric and water connections, and an upgrade to the wastewater treatment plant. Increased visitor opportunities within the District are expected to result in land use conflicts including degradation of air quality, visual and aesthetic impacts, traffic congestion and crowding.

4.7.4.3 Access and Circulation

Alternative E would create direct, long- term, major, adverse effects on traffic and circulation within the District. Alternative E proposes public lodging at cabins in one area of the District, temporary housing for visiting scientists in another area, exterior restoration of cabins for use as interpretative exhibits and overnight accommodations and dining facilities for the general public at the Wonderland Hotel (if E2 is chosen). Due to the high level of redevelopment, this alternative has the second greatest potential for traffic problems. Compared to the No Action Alternative, the estimated change in volume of trips along Elkmont Historic District roads is 1,050 (1,467 if E2 is implemented). A comparison of estimated change in volume of trips between alternatives is provided in the summary tables at the end of this chapter.
To alleviate potential conflicts between vehicles and pedestrians, a number of roadway modifications are included. However, even with the proposed modifications, the level of service in some areas would be reduced (from A to B if E1 is selected and from A to C if E2 is selected), resulting in a decrease in average travel speed, increased percentage of time spent following and reduced headway between vehicles. The Level of Service describes operational conditions within a traffic stream, with Level A representing free flow traffic, up to Level F in which traffic delays can be severe. A change from Level A to Level B would result in a decrease in average travel speed, increased percentage of time spent following and reduced headway between vehicles.

4.7.5 Impacts on Other Resources

4.7.5.1 Viewshed

Impacts to visual quality consist of changes that would alter or obstruct (1) visible landscape features from dominant viewpoints established as part of this analysis; and (2) access and visibility to dominant or important viewpoints or sequences of viewpoints. The primary viewpoints or sequences of viewpoints within the District are from existing roadways and trails. Currently, the building grounds are closed to the public and access to many of the viewpoints within the District is prohibited due to safety concerns related to the condition of the buildings.

The established baseline for this environmental analysis and the associated visual analysis is the No Action Alternative. This baseline identifies a naturally regenerated landscape within the study area as the condition for the visual analysis. The buildings within the study area are considered obstructions to the natural viewshed that would be

removed if the General Management Plan (the No Action Alternative) was implemented. As a result, long- term, indirect, major, adverse effects would be created by retention of buildings in most areas of the District (including the reconstructed Wonderland Hotel and restored / rehabilitated Annex under E2). Although retention of these buildings would adversely affect visual quality by obstructing the natural viewshed, some long-term, negligible benefits to visual quality and aesthetics would be realized through removal of the most of the buildings in Society Hill, increasing the area available for restoration of native plant communities (photos 3 through 6A in Appendix D depict the existing views of a variety of historic buildings and simulations of the potential views following removal of these buildings). Installation of new infrastructure components required to implement these alternatives (parking areas, paths, electrical, sewer and water supply components) would further impact the natural viewshed. Direct, adverse impacts to the District viewshed are expected to occur during implementation of Alternative E because of the presence of machinery and ground disturbance but these effects would be short- term and negligible.

The viewshed sensitivity maps shown in the Visual Quality Assessment (Appendix D) indicate the areas visible from a variety of viewpoints throughout the District. The direct effect on the composite viewshed would also be long- term, major, and adverse under Alternative E due to retention of most buildings, structures, and cultural landscape components. Composite viewshed areas shown (Figures 7, 8 and 9, Appendix D) would also be adversely impacted by building retention with regard to the area that is visible from the transportation corridors.

4.7.5.2 Soundscape

Direct, short- term, minor adverse effects on the soundscape are expected to occur during project implementation due to construction activities. The high noise levels of combustion- powered equipment, particularly due to earth moving equipment (usually diesel), are expected to be the main contributor to the sound levels during construction and can interfere with the ability of individuals near the work site and passersby to hear speech. Peak noise levels from construction as measured at a distance of 50 feet may vary from 70 dBA to 100 dBA. The major construction elements of this project may include removal of buildings, hauling, grading, and paving, as well as restoration and rehabilitation of buildings and construction of new facilities. Overall, construction noise is relatively short in duration and would be restricted to daytime hours at the time of year in which visitation is expected to be the lowest.

Future noise levels under Alternative E are expected to be in the 50 to 60 dBA range, with maximum levels (over short periods of time) exceeding 70 dBA for loud vehicles. As in the No Action Alternative, since these noise levels do not exceed the noise abatement criteria of 67dBA, Alternative E would have no long- term effect on noise in the District.

4.7.6 Impacts on NPS Operations

As is the case with all alternatives, the buildings and associated grounds would remain closed while project implementation is occurring. In addition to removal of buildings, E1 includes modifications to existing infrastructure, restoration of cabins for interpretive exhibits and restoration and rehabilitation of the Appalachian Clubhouse as a public day use rental facility. Reconstruction of the Wonderland Hotel in conjunction with

restoration and rehabilitation of the Annex is also proposed in E2. In addition, temporary housing for visiting scientists would be provided at six cabins in Millionaire's Row, while public lodging would be provided at cabins in the Wonderland Club. All of the new visitor facilities, exhibits and infrastructure would have to be maintained by NPS staff, adding to current operation and maintenance costs.

Alternative E would create direct, major, adverse effects on NPS operations. The need for funds or staff to protect the buildings from vandalism or further deterioration would be increased in this alternative respective to all others previously discussed. Although maintenance of the cabins, Wonderland Hotel and Annex would be the responsibility of the concessioner, funds and staff would be required to maintain the buildings retained in Daisy Town, the Chapman and Spence cabins, the visiting scientist housing, the interpretive exhibits, and the day use facilities at the Appalachian Clubhouse, as well as the general infrastructure (roadways, parking lots, walkways, water supply and wastewater systems). Maintenance activities would include such items as mowing, road repairs, daily cleaning and supply of public restrooms, repair of structural damage to buildings not operated by the concessioner, and general maintenance of utilities and infrastructure. Some of the costs associated with long- term maintenance and other requirements of Alternative E could be offset by revenues gained from rental of the Appalachian Clubhouse as a day use facility.

The concessions services included in Alternative E would have a direct, adverse impact on the NPS concessions management program as a result of the substantial increase in the workload for this program. The increased workload would begin with project planning and would continue through the opening and operation of the new facilities. Concessions management would be heavily involved in planning for new facilities and services, selection of a concessioner, completion of capital improvements required, transition to a new concession contract, and overseeing actual operation by the concessioner. It is anticipated that funding would be required for a full- time GS- 9 or GS- 11 Concessions Management Specialist/Assistant to supplement the current staffing in this program of one Concessions Management Specialist. Funding for an additional vehicle, office space, and office equipment for this position would also be required.

The need for law enforcement would also increase substantially as a result of increased visitation, potential traffic and circulation problems, increased encounters with wildlife, and other emergencies that may arise. Law enforcement needs are expected to change significantly to the extent that housing and funding for a full- time ranger (level GS- 9) would be required to police the exhibits and buildings retained.

In moist cove forest communities, such as those found in the District, research has shown that between one and one and one- half percent of canopy trees fail on an annual basis (Runkle 1982). Therefore, hazard trees adjacent to exhibits, trails, roadways and buildings would be removed to reduce the possibility that visitors could be harmed by falling trees. The indirect effect on NPS operations due to hazard tree and other vegetation management is expected to be long- term and moderately adverse because most areas of the District and the grounds would be open to the public.

4.7.7 Cumulative Effects

With the exception of Society Hill, where all but one building would be removed, most contributing buildings would be retained under this alternative. The removal of 17 to 19 contributing buildings in Alternatives E would cumulatively add to the loss of historic buildings from this period of significance in the Park. Other resort properties representing this time period, such as hotels and lodges inside the Park and hotel and cabin communities outside the Park, have been removed or may no longer retain historic integrity. When added to past actions, implementation of this alternative would cumulatively result in a loss of groupings of buildings representing this period in southern Appalachian history.

Retaining buildings throughout the District, in conjunction with the level and type of use proposed under Alternative E would leave little opportunity for expansion of existing plant communities, including the globally imperiled montane alluvial forest. This plant community type is considered imperiled because only six to twenty examples of this community type are known to exist globally. In the Southern Appalachian Mountains, alluvial floodplain forests have experienced severe impacts and losses as a result of intensive land use and development in the relatively flat and highly productive valley bottoms. Outside of the National Park, there are no assurances these areas will remain in forest. This would result in a long- term, major, cumulative adverse effect as an opportunity to reestablish this rare plant community would be eliminated. If Alternative E was implemented, beneficial cumulative effects to natural resources would generally be created by removal of buildings and subsequent revegetation throughout a portion of the District, but these beneficial effects would be less than all previously discussed alternatives and would not include the montane alluvial forest.

The impacts of implementing Alternative E on floodplains and wetlands would be primarily limited to the District and the Little River watershed. This alternative would create long- term, minor adverse cumulative effects on wetlands and the 100- year floodplain by proposing activities in the District that would not be compatible with reestablishment of plant communities that could provide soil stabilization and reduction in erosion and sedimentation. Although water quality in the Little River and its tributaries has remained excellent, contributions of sediments from erosion or petrochemicals from parking area runoff can add to the existing load already entering the river system from the high number of visitors to the Park and surrounding gateway communities. Only six water bodies in the State of Tennessee are designated as Outstanding National Resource Waters. Four of these waters are located within the Park. All development within ONRW watersheds are strictly regulated to prevent degradation of these waters. The increase in runoff anticipated under Alternative E would contribute to the cumulative effect of contaminants entering the river from surrounding communities and from other land uses within the Park.

The increased visitation and internal traffic within the District to view exhibits would create a long- term, major, adverse effect on air quality. The effect of increases in NOx and VOC emissions resulting from implementation of Alternative E is very small when compared to overall emissions in the Park and in the region. However, because the entire Park is designated a non- attainment area and a Class I area under the Clean Air Act (the highest level of air quality protection) even a small increase adds to already degraded air quality and constitutes a long- term adverse cumulative effect.

Invasive, non- native plant species thrive in disturbance areas. The spread of invasive, non- native species could be further exacerbated by increased disturbance caused by pedestrian traffic into sensitive areas. Permanent revegetation with native species would create a beneficial cumulative effect by reducing the area available for invasive, non- non native species to become established, thereby decreasing the potential for these species to infiltrate into surrounding areas of the Park. Failing to continue an invasive, non-native species management program at Elkmont Historic District could, over time, result in the spread of those species into other areas of the Park adding exponentially to the existing adverse effects that invasive, non- native species have on the Park's botanical diversity. In addition, cumulative adverse effects to NPS operations would also occur as a result of implementing Alternative E, primarily due to the costs of project implementation and operations within the District following project completion.

Even with a projected shortfall in funding of approximately $1.1 million in 2004, every law enforcement position continues to be filled immediately so that the safety and emergency response expected by visitors is not compromised. If Alternative E is implemented, funding of the entire project implementation ($13.5 million for E1; $21.8 million for E2) would have to be provided from another source. Additional funds would have to be reallocated from other programs in the Park to meet maintenance and law enforcement needs. Both of these economic needs would result in long- term, major, adverse cumulative impacts on Park operations.

4.7.8 Conclusion

Implementation of Alternative E would create major impacts to native plant communities where buildings are retained, resulting in a loss of potential for the long-term recovery of these resources. Disturbances to the forested ecosystem due to the retention of buildings and associated activities under this alternative would eliminate critical biological components, necessary for characteristic forest stand development through time. The specific species composition and temporal component required for the globally imperiled montane alluvial forest to become reestablished at this site would be eliminated if this alternative was implemented.

Additional development would result in increased surface water runoff and associated degradation of the water quality of the Little River, an Outstanding National Resource Water. Other resources whose productivity would be adversely affected or limited as a result of implementing Alternative E include soils, floodplains, aquatic and terrestrial communities, wetland functional values, habitat for threatened, endangered, rare and sensitive species, water quality and air quality. Under Alternative E, the overall long-term productivity of biotic resources would be adversely affected due to the retention of buildings, paving, installation of infrastructure, and increased visitation expected throughout the District.

Direct, long- term, major beneficial effects would be created by the retention of the Appalachian Clubhouse, the 16 Daisy Town cabins, the Chapman cabin (#38), the cabins in the Millionaire's Row and Wonderland Club areas, and the retention of most of the District's cultural landscape characteristics and features. Reconstruction of the Wonderland Hotel under E2 would provide direct benefits to cultural resources and to visitor use facilities. Retention of these features would also provide more opportunities for cultural resource interpretation. The expanded interpretive opportunities, providing

access to trails and exhibits, and correction of erosion problems at culverts are all beneficial effects. Other areas that would benefit from Alternatives E are visitor facilities and visitor experience. In addition, revenues achieved through rental of the Appalachian Clubhouse as a public day use rental facility could be used to offset the long- term maintenance and management costs associated with these alternatives.

Irretrievable commitments of resources would result if Alternative E was implemented as a result of removing 17 to 19 contributing buildings. Cultural landscape characteristics and features (mainly "spatial organization" and "buildings and structures"; see Table 3-3) would be impacted due to removal of the buildings in the Society Hill area. Indirect, long- term, moderate, adverse effects on the District and cultural landscape would include wear and tear on cultural resources retained due to increased internal trips to view exhibits and increased visitation. There would also be an irreversible commitment of resources due to elimination of up to 22 acres of potential montane alluvial forest habitat where buildings are retained.

Some unavoidable adverse impacts associated with implementing Alternative E would occur on many of the natural resources, including soils, floodplains, aquatic and terrestrial communities, wetland functional values, habitat for species of concern and water quality. These effects are due to retention of buildings in the floodplain, increased area of impervious surfaces, increased visitation and subsequent pedestrian traffic along with greater potential for soil compaction and damage to vegetation from trampling, loss of potential for reestablishment of montane alluvial forest and increased potential for human encounters with wildlife. Two buildings would be retained for overnight use within the 100- year floodplain under this alternative. A garage that lies within the floodplain would also be retained. These actions would be contrary to NPS policy that expressly prohibits development within floodplains and would therefore require a formal Statement of Findings if this alternative would be implemented.

Greater visitation under Alternative E would result in degradation of air quality, additional wildlife habitat disturbance and wildlife / human encounters, more ground disturbance to install infrastructure components, creation of more parking spaces to accommodate increased traffic and additional costs to NPS operations for staffing and maintenance of the buildings and infrastructure, maintenance of the visiting scientist housing, management and implementation of the concessions contract, increased vegetation management, and additional law enforcement to deal with the impacts of increased visitation. Adverse effects on land use would occur due to crowding and traffic congestion caused by the increase in visitation to exhibits, cabins and (under E2) the Wonderland Hotel and Annex. Compared with all previous alternatives discussed, Alternative E also would provide less opportunity for benefits to native plant communities as restoration and revegetation are proposed throughout less of the District.

The proposed concession operation under E1 would allow the concessioner to rent 7 cabins and to provide the eco- tourism options to visitors as described earlier in this section. Under E2, the concessioner would have the ability to rent the cabins, as well as the reconstructed Wonderland Hotel and the Annex, and the opportunity to provide food service to all of the lodging guests would be included. The estimated total cost in 2007 dollars of implementing E1 and E2 are approximately $13.5 million and $21.8 million,

respectively (see Appendix C). These costs include the initial investment to modify the existing infrastructure to accommodate more visitors, which is approximately $2.4 million in E1, and $3.3 million in E2. The infrastructure costs in Alternative E1 are associated with connecting cabins to the water supply and wastewater systems. The additional funds for installation of the infrastructure in E2 represent the costs of providing water, wastewater, and parking for the Wonderland Hotel. An additional $6.1 million would be required to reconstruct the Hotel, restore and rehabilitate the Annex, and to install all the infrastructure components required to support the proposed use for these buildings under E2.

As part of this planning process, the economic feasibility of operating a concessions operation under E2 was examined (Lodging Resources 2004). The study indicated that the concessioner would not be able to make an initial investment in any of the capital improvements other than furniture, fixtures and equipment (FFE) necessary to run their operation and still have a reasonable opportunity to make a profit under E2. Although the study did not analyze the feasibility of E1, the income and profit levels in E1 would be expected to be significantly lower since the Hotel and Annex would not be a part of the concession operation. While it is not likely that a concessions operation could operate at a profit under E1 given that there are only seven cabins to rent to visitors and no food service, a thorough economic analysis of this alternative would have to be completed if it is selected for implementation. The Lodging Resources study should be viewed as a preliminary review only and conclusions regarding financial feasibility as only tentative. If either E1 or E2 are selected, a more thorough analysis of the selected alternative would be required to verify the feasibility of these alternatives and to develop a concessions contract.

Per the terms of the National Parks Omnibus Management Act of 1998 (16 USC Sec. 1a 5), and NPS *Management Policies* (2000), the NPS is responsible for determining whether or not concessions operations are necessary and appropriate "for public use and enjoyment of the National Park System in which they are located". A variety of legal policy requirements must be referenced in this analysis. Some of the considerations of these requirements include:

- the potential for adverse effects to Park resources that may be caused by a concessions operation;
- the suitability of the location proposed for commercial services and its proximity to existing services;
- the necessity of the concessions for the public to use and enjoy resources within the Park;
- the consistency of the concessions plan with conservation and preservation of natural resources;
- the ability to incorporate sustainable principles and practices in planning, sighting, construction, utility systems, selection, and recycling of building materials, and waste management;
- the ability of the concessions operation to enhance visitor use and enjoyment without causing unacceptable impacts to resources; and
- development of facilities and services restricted only to those necessary to achieve the Park's purposes.

Overnight use for the purpose of historic preservation at Elkmont was considered appropriate; however, based on the considerations listed above and other considerations found within 16 USC Sec. 1a 5 and NPS *Management Policies* (2000), the NPS has determined that the concession operations proposed in Alternative E are not necessary and appropriate and therefore, should not be implemented within the Elkmont Historic District.

4.8 Impacts of Alternative F

Alternative F entails the retention of all of the historic buildings in the District, with the exception of six cabins and a garage that are too structurally deficient to retain. Four other cabins and a rear room constructed in the 1970s or later are considered noncontributing and would be removed. Removal would be carried out by mechanical means or by hand. Buildings to be retained under Alternatives F include 16 cabins and the Appalachian Clubhouse in Daisy Town; 23 cabins and associated buildings in Society Hill; six cabins in Millionaire's Row; eight cabins in the Wonderland Club. F2 also proposes reconstruction of the Wonderland Hotel and restoration and rehabilitation of the Annex.

Day- use visitation as a result of implementing Alternative F is expected to increase by an average of 36 visitors per day, plus an estimated maximum of 226 or 278 guests (depending on whether F1 or F2 is implemented) utilizing overnight lodging. The length of an average daily visit is also expected to increase due to the various opportunities provided by day use of the Appalachian Clubhouse, the walking tour through Daisy Town, the various exhibits throughout the District, and public lodging in the Millionaire's Row, Society Hill and Wonderland cabins. Public lodging would also be provided in the reconstructed Wonderland Hotel and rehabilitated Annex under F2. Existing recreational use would continue to occur. New exhibits are proposed under this alternative and the Elkmont Nature Trail brochure would be updated to include natural and cultural information on Elkmont. The Park would continue to implement its existing natural resource management activities.

Some changes to parking and circulation within the District would be required. Once this work was completed, a concessioner would be responsible for most of the operation and maintenance costs in the District, but a moderate increase in NPS operation and maintenance expenditures would be required beyond what the Park already budgets for the roads, parking, water and wastewater systems, and operations and staffing.

4.8.1 Impacts on Cultural Resources

<u>Buildings and Cultural Landscape</u>

Implementation of Alternative F would result in direct, permanent, minor, adverse effects to the aboveground cultural resources of the Elkmont Historic District. Under F1, three contributing buildings would be removed. Under F2, one contributing building would be removed and the Wonderland Hotel would be reconstructed with a rehabilitated Annex. The majority of Elkmont's cultural landscape features and the overall District setting would be retained under this alternative.

Of the three contributing buildings proposed for removal under F2, two (Wonderland Hotel and Knaffl cabin (#36)) have significant portions that have collapsed. In addition, despite stabilization efforts, the Hotel Annex remains in Fair to Poor condition.

The cultural landscape characteristics and features of Elkmont, such as the historic swimming hole at Little River, stone walls and a footbridge over Bearwallow Branch, would be retained under this alternative as would eligible cultural landscape features. The preservation of the retained cabins, the rehabilitation of the clubhouse, and if F2 is

implemented, the reconstruction of the Wonderland Hotel, would be conducted in accordance with *The Secretary of the Interior's Treatment Standards*.

New visual elements would be introduced into the District, including an orientation kiosk with exhibits, ten wayside exhibits, six parking areas (seven if F2 is chosen), paths and roads, a replacement bridge, a well house, the pumping station access hatches and electrical control panel, a booster pump station and the stream bank stabilization work at the culverts where erosion has occurred.

Under Alternative F, there would be minor, adverse effects on the cultural landscape caused by the removal of one to three contributing buildings and to a limited degree, the addition of modern landscape elements such as parking areas and paths.

Indirect, long- term, moderate, adverse effects on the District and its landscape would result from the significant increase in visitation and would include traffic congestion, along with wear and tear from increased pedestrian traffic at the Appalachian Clubhouse; the Wonderland Hotel and Annex (if F2 is implemented); the Society Hill, Millionaire's Row and Wonderland Club cabins; and potentially at the porches of the retained Daisy Town buildings and the Chapman cabin (#38).

Long- term, beneficial effects would include retention of most of the buildings in the District; reconstruction of the Wonderland Hotel (as a contemporary re- creation of the original building) and restoration/rehabilitation of the Annex (if F2 is chosen); and retention of most of the District's cultural landscape characteristics and features. Restoration, rehabilitation, preservation, and reconstruction of the retained buildings in accordance with *The Secretary's Treatment Standards* would provide a direct, long- term, minor to major beneficial effect, as would the restoration of one noncontributing building (Swan (#4)) to a point within the period of significance based on available documentation.

The wayside exhibits, parking areas, new paths and roads, replacement bridge (F2 only), and the stream bank stabilization at eroded culverts would create minor, but acceptable adverse effects on cultural resources. The proposed new elements would constitute a minimal visual change District- wide. In addition, the proposed parking areas, paths, roads, and bridge would be located in areas already visually impacted by existing roads, paths, parking areas, and a noncontributing bridge.

The proposed utility lines would be buried in the ground, thereby removing intrusive power poles that postdate the period of significance. The belowground pumping stations would not be visible, except for small access hatches placed flush with the ground. The pumping station behind the Wonderland Hotel would have an aboveground electrical control panel roughly two to three feet tall surrounded by a security fence. These minor elements would be designed to be as unobtrusive as possible. The proposed well house would be small in size and located away from the District buildings in an area where it could be screened.

The long- term, indirect effects on the District and its landscape caused by the increase in visitation and traffic congestion, as well as wear and tear on buildings and landscape features, could reach the level of adverse effect, due to the numbers of visitors and

vehicles projected and the more intensive use proposed for many of the buildings and features slated for retention.

Archeological Resources

As with all alternatives, the potential for Alternatives F to impact archeological resources depends on the level, extent and location of ground- disturbing activities. Compared to all other alternatives, these alternatives propose retention of the greatest number of buildings for reuse either as lodging, day use or for interpretive exhibits. Consequently, additional water, sewer and electrical lines, parking lots, and paving activities would be necessary. The excavation and other ground disturbance required to install these features could adversely affect archeological resources. These impacts would be permanent, direct, adverse, and could be major. In addition, there is the potential for increased visitation and pedestrian traffic to result in site erosion following trampling of the plant cover. Additional site erosion could result in disturbance to shallowly–buried archeological deposits. These impacts would be indirect, permanent and could potentially be minor to moderate. The areas where archeological resources could potentially be adversely affected include one locus where significant resources have been documented, seven loci where potentially significant resources have been identified, and two areas that have not yet been surveyed. There would be no effect on potentially significant resources at nine loci (see Table 4- 2).

Compared to the No Action Alternative, Alternatives F include three additional loci where potentially significant resources have been identified and could be adversely affected by installation of the Little River Trail and Wonderland Hotel parking areas and installation of sewer and water lines. The ultimate impacts to archeological resources due to project implementation would depend on the outcome of additional investigations. NPS staff would continue established resource protection measures for the identification and treatment of archeological resources on a case- by- case basis. The proper execution of avoidance or protective strategies could ensure that no effect on archeological resources would occur.

Section 106 Determinations

Under Section 106 of the National Historic Preservation Act, the removal of one to three contributing buildings within the NRHP- listed Elkmont Historic District would constitute an adverse effect.

The potential effects to archeological resources under Alternative F could also result in a determination of adverse effect.

All mitigation will be determined through formal consultation with the Tennessee State Historic Preservation Office, the Advisory Council on Historic Preservation and the Chickasaw Nation and Eastern Band of the Cherokee Indians Tribal Historic Preservation Officers. The exact type (s) and cost of the mitigation cannot be calculated at this time.

4.8.2 Impacts on Natural Resources

Impacts to natural resources due to implementation of Alternative F would result primarily from ground- disturbing activities associated with building removal and infrastructure modifications. Additional long- term impacts would result from increases

in visitation and pedestrian traffic. These effects are discussed below for each natural resource.

4.8.2.1 Soils

Implementation of Alternative F would create a direct adverse effect on soils. This effect is the same as described for Alternative E, but is further exacerbated by retention of additional buildings, a greater increase in visitation and pedestrian traffic, installation of more sewer and water lines, and additional modifications to infrastructure to accommodate the needs of the alternative.

Alternative F proposes removal of 14 buildings total in Elkmont Historic District (12 if F2 is chosen). As a result, short- term, adverse effects on soils would occur during project implementation if the use of heavy machinery and other equipment is necessary for removal of the buildings. Short- term, moderate, adverse effects to soils would occur as a result of installation of new water and sewer lines, underground utility lines, asphalt paths, and road repair and construction. All of these activities would require either excavation or grading, resulting in adverse effects to soils over a wider area in the District than in the No Action Alternative. Impacts occurring during construction would be mitigated by protocols established by the Park to minimize impacts to soils and the adverse effects on soils due to project implementation activities would be temporary.

In the long term, since the number of visitors is expected to increase by approximately 7 percent and the increase in internal pedestrian trips is estimated from 54 to 100 percent (depending on whether F1 or F2 is implemented), the soil compaction and related indirect, adverse impacts to plants due to trampling would likely be moderate to major.

Additional activities required under Alternative F include construction of six parking lots (plus one additional lot and expansion of another) to provide additional spaces (if F2 is selected), a gravel parking area, installation of water and sewer lines, (plus gravity sewer service lines for the Wonderland Hotel and Annex if F2 is selected), low pressure sewer force main, expansion of the wastewater treatment plant, road repairs and minor widening, installation of paths, and a new bridge across the Little River. All of these activities would cause additional ground disturbance and result in adverse effects on soils over a wider area in the District than in the No Action Alternative. For some activities, such as sewer and water line installations, the adverse effects would be temporary. The new bridge construction across the Little River is of particular concern due to the presence of flowing water. Although Best Management Practices would be followed to minimize adverse effects, any construction within a stream channel would likely cause a temporary increase in erosion and sedimentation into the river. As vegetation is reestablished, the erosion rate would decline and adverse effects on soils would be diminished in those areas where pipes and bridges are installed.

Some impervious surfaces would be eliminated when the buildings are removed (0.79 acres in F1 and 0.32 acres in F2). Subsequently, additional area would be available for surface water infiltration and runoff quantities would decrease in those areas, providing long- term, minor, beneficial effects to soils. Once vegetation is reestablished in areas formerly occupied by buildings, the plants would supply additional protection from erosion by preventing rain from falling directly on bare soils and by stabilizing soils with

their root systems. The beneficial effects provided by the vegetation would increase as the plants mature.

Although impervious surfaces would be removed in some areas under this alternative, in other areas, impervious surfaces would be added by the paving of roads and parking areas. In addition, since the number of visitors is expected to increase and the estimated increase in internal pedestrian trips is likely to be considerable (see Table 4- 7), additional incremental impacts would occur due to soil compaction and related impacts to plants from trampling.

An additional 2.4 acres (F1) and 3.5 acres (F2) are proposed to be covered with pavement. Pervious concrete would be used in parking areas and some infiltration is possible where this material is used. However, the surface would produce higher rates of runoff than undisturbed, vegetated surfaces, producing long- term, moderate adverse effects. Implementation of F1 would result in a 5.6 percent increase over the No Action Alternative. Runoff would increase by approximately 6.9 percent under F2, primarily due to construction of the new parking area adjacent to the Little River that would provide overflow parking for visitors to the Wonderland Hotel. This increase in runoff could cause additional soil erosion and subsequent sedimentation of surface waters and result in indirect, long- term, moderate adverse effects on soils.

4.8.2.2 Biotic Communities

4.8.2.2.1 Terrestrial Plant Communities

Most of the historic buildings are proposed to be retained under Alternative F. As a result, there would be essentially no opportunity for expanding existing plant communities or reestablishing the globally imperiled montane alluvial forest. Major, adverse effects to terrestrial plant communities are expected because chronic disturbance of vegetation would continue throughout the District due to the retention and proposed use of most buildings, pedestrian traffic and hazard tree management. The necessary hazard tree removal, in addition to the physical presence of individual buildings and associated infrastructure, would severely disrupt plant community dynamics within the District.

Initial vegetation management would be aggressive adjacent to retained buildings. Subsequent annual maintenance of the perimeter around historic structures would continue to be intensive, permanently preventing old growth forest structure from developing. Because the grounds would be open to the public and buildings would be retained throughout the District, a significant amount of vegetation management would be required. At each remaining building, and at exhibits and trailheads, hazard tree removal and vegetation management would be needed.

These direct adverse impacts are expected to be long- term and major, and would occur over a larger area in this alternative than in previously discussed alternatives because almost all buildings would be retained. Effects would be incrementally greater if F2 is implemented due to retention of the Wonderland

Hotel and Annex. Increased pedestrian and vehicular traffic would also create long- term, indirect negative major impacts on biotic communities.

In Millionaire's Row, Daisy Town, Society Hill and the Wonderland Club, the majority of the buildings are proposed to be retained, eliminating the potential for expansion of plant communities in those areas. The retention of buildings and the associated activities within the Little River floodplain in the area known as Millionaire's Row would result in a reduction in the area available for reestablishment of the globally imperiled montane alluvial forest.

Short- term, moderate, direct adverse effects to biotic communities are expected to occur during construction as well as indirect, long- term adverse impacts following project implementation. During construction, excavation would disturb vegetation and most likely require removal of smaller trees and root masses. The possible use of heavy equipment for removing buildings along with the vehicular and pedestrian traffic would likely cause temporary disturbance of plant communities. Under F2, the activities required for reconstructing the Wonderland Hotel and providing access to it and the Annex would require ground disturbance for installation of sewer, water and electrical lines, and paving of parking areas. Following construction, the expected increase in visitation, and the increase in pedestrian traffic would further increase the stress on plant communities and wildlife habitat.

Visitation under this alternative is estimated to be at the highest level of all project Alternatives. The higher visitation rate would be accompanied by a proportional increase in the improper storage and disposal of food items. Food brought into day use areas and garbage attracts wildlife, increasing the potential for human – wildlife encounters. Encounters with black bears, raccoons and even small rodents can be dangerous for both the human and the wildlife species involved. Increased traffic would also increase the potential for vehicular collisions with wildlife. These indirect, adverse effects on wildlife would be minor because they affect individuals and not entire populations..

4.8.2.2.2 Aquatic Communities
Direct, short- term, negligible, adverse effects to aquatic communities could result during implementation of Alternative F. These effects would occur during project implementation, primarily due to the ground disturbance, potential erosion, and runoff into surface waters that could occur following the use of heavy equipment. Installation of sewer, water, power, and phone lines will all result in temporary disturbance within and adjacent to the floodplain of the Little River. Protocols for project operations and impact avoidance measures have been developed by the Park to minimize the potential for adverse effects to biotic communities (see Section 2.2.1). Even with incorporation of these measures, the nature of the work may result in unavoidable, yet negligible discharges of sediment into aquatic environments.

The overall indirect effect to aquatic resources in the District would be minor, long- term, and adverse, resulting from an increase in impermeable surfaces and associated runoff into surface waters. Increased visitation will result in trampling

of vegetation and loss of soil stability. Increased traffic and parking will result in deposition of petrochemicals, that, when mixed with rainfall runoff, can result in contamination into adjacent aquatic systems.

4.8.2.3 Threatened, Endangered, Rare and Sensitive Species

Alternative F would have no direct effects on federal- listed threatened or endangered species, since none are known to occur within the proposed project implementation area. A state threatened species, butternut, and two State Special Concern species, Fraser's sedge (*Cymophyllus fraserianus*) and chamomile grapefern (*Botrychium matricariifolium*), occur within the District. Because many of the buildings would be retained under Alternative F, and visitation is expected to increase following project implementation, increases in suitable habitat for threatened, endangered, rare and sensitive species are expected to be negligible. Due to the increased visitation expected under Alternative F, the potential for trampling of herbaceous vegetation by pedestrians would also be elevated, indirectly resulting in long- term, minor adverse effects on these species. The chamomile grapefern is especially susceptible to the damage from trampling and the viability of its populations in the District is monitored by the Park for that reason.

The hellbender (*Cryptobranchus alleghaniensis alleghaniensis*), is a large aquatic salamander with a state designation of "deemed in need of management" (similar to State Special Concern status for plant species). This salamander is not known to occur at Elkmont, but a population does exist within the Little River, downstream from "The Sinks", a natural waterfall within the Park. As a result, any actions in the District that could impact habitat downstream or water quality within the Little River could indirectly affect the hellbender. Short- term, adverse effects to water quality during construction are expected to be minor. Following project implementation, increased impervious surfaces and associated runoff could result in minor adverse effects to water quality and could adversely affect aquatic species downstream, such as the hellbender.

Although it is not a federally or state- listed species, the synchronous firefly that has been observed in the District could benefit from expanded habitat as well; however, retention of most of the buildings would prevent an increase in grassy habitat from occurring following project implementation. Increased visitation could potentially result in long- term, moderate, adverse effects on synchronous firefly populations in the District.

Overall, the long- term indirect effects to threatened, endangered, rare and sensitive species is expected to be moderately adverse due to impacts on existing and potential habitat (Table 4- 13).

4.8.2.4 Wetlands

Direct, short- term, minor, adverse impacts to wetlands would occur as a result of implementing Alternative F. Under F1, all but 14 buildings would be retained (12 in F2) across all areas of the District. Installation of sewer, water, and electrical lines, and additional infrastructure required to support the buildings retained would require minor excavation and grading. Wetlands along Bearwallow Branch would be especially susceptible to the adverse effects of installing these infrastructure components.

The long- term, indirect effects on wetlands due to implementation of either of these alternatives are expected to be adverse, but minor. Wetlands may be indirectly adversely affected by the retention and use of adjacent buildings, such as those found in Millionaire's Row. The environment surrounding residential buildings has historically been subjected to runoff from impervious surfaces, soil compaction, deposition of petrochemicals, planting of non- native species and vegetation management. These types of chronic disturbances tend to result in loss of native plant diversity and subsequent degradation of wildlife habitat. Wetlands that abut residential properties would be subject to adverse effects resulting from these chronic disturbances.

Several wetland functions and values would be somewhat diminished, including wildlife habitat, aesthetic/visual quality, flood storage, water quality, and fish/shellfish habitat. As in all alternatives, the wetlands adjacent to Bearwallow Branch in Millionaire's Row would be most susceptible to these effects.

4.8.2.5 Water Quality

Potential short- term, minor adverse impacts to water quality could occur as a result of implementing Alternative F. Changes to surface water runoff rates and volumes would occur, and additional discharge of treated wastewater into the Little River would be required.

Both of these alternatives propose retention of most buildings throughout the District. However, activities associated with removal of some buildings and installation of infrastructure, including sewer and water lines, parking areas, and electrical service required under each alternative would create some ground disturbance caused by heavy equipment and the movement of construction vehicles to and from the areas containing the buildings. Although Best Management Practices would be followed, there would still be potential for erosion and sedimentation into water bodies to occur during project implementation, including in those areas where buildings are being restored, rehabilitated or reconstructed. This could result in a short- term, direct, minor adverse effect on water quality during construction. However, once disturbed areas are planted and vegetation has become established, some of these effects would be mitigated.

Retaining most of the buildings in this alternative would increase runoff compared to the No Action Alternative because more impervious surfaces would remain. In addition, 2.4 and 3.5 acres (see Table 4- 3) would be paved under F1 and F2, respectively. This would further increase the potential for runoff and soil erosion. Compared with the No Action Alternative, the increases in rainfall runoff due to pavement runoff under F1 and F2 (see Table 4- 5) are estimated at 5.6 and 6.9 percent, respectively. Therefore, long- term, indirect effects to water quality are expected to be minor and adverse.

<u>Sewage Treatment and Pollutant Discharge</u>

Alternative F includes rehabilitation of the Appalachian Club interior for day use, which requires public restroom facilities; rehabilitation of cabins in the Millionaire's Row, Society Hill and the Wonderland area for public lodging; and, if F2 is chosen, reconstruction of the Wonderland Hotel and Annex for lodging. The additional wastewater treatment for these improvements is estimated at 14,954 and 23,467 gallons per day for F1 and F2, respectively.

Because treated wastewater is discharged into the Little River, which has been designated an Outstanding National Resource Water, the discharge must not add any additional pollutants to the river or degrade the current water quality. In addition, because the State of Tennessee's environmental regulations prohibit expansion of the hydraulic capacity of the existing plant, the additional wastewater treatment would have to occur at an alternate location, either through addition of a drip irrigation system located in a suitable area outside of the District, or by piping the wastewater to the nearest treatment plant in Gatlinburg. If either of these methods were utilized, a separate investigation of the potential resource impacts associated with construction these systems would be required prior to implementation. Water quality standards for Outstanding National Resource Waters are expected to continue to be met at the Elkmont wastewater treatment plant because concentrations of contaminants would remain below the water supply maximum contaminant level at that location (See Table 4- 12). Because water quality standards for Outstanding National Resource Waters would continue to be met through the use of alternative treatment methods, no long-term effects to water quality are expected to result from increased wastewater discharge under F1 or F2.

There are not any baseline conditions established for thermal loading, other than typical wastewater temperatures of 60 degrees Fahrenheit (see Section 2.2.1); however, the incremental increase in effluent discharge resulting from these alternatives is such that temperature effects are expected to be negligible (McGill Associates 2004).The effluent discharge rate would remain the same as the existing condition under all alternatives. At the current rate of discharge, thermal impacts are dissipated entirely within three feet of the discharge pipe due to effluent mixing with cooler water in the pipe from the plant to the discharge point. Because the cooling would continue and the rate of discharge would remain the same under all alternatives, there would be no thermal impacts to the Little River as a result of implementing this alternative (McGill Associates 2004).

4.8.2.6 Floodplains

Short- term, minor, direct, adverse effects on the 100- year floodplain are expected to occur as a result of implementing Alternative F because of temporary increases in erosion and sedimentation expected during project implementation. Over the long term, implementation of Alternative F would create a moderately adverse effect on floodplains by increasing the amount of impervious surfaces and the erosion potential throughout most areas of the District. The parking areas, roadway improvements, and soil disturbance required to implement the portions of Alternative F that would accommodate the expected increase in visitation, and the visitation itself, would be detrimental to most native plant communities that allow for soil stabilization and precipitation infiltration. This effect would be most evident in Millionaire's Row, which was constructed around the floodplain of Bearwallow Branch.

Most buildings in Millionaire's Row would be retained, including three that lie within the 100- year floodplain limits (Miller (#46), Faust (#47) and Faust garage (#47A)). Use of these three buildings would be contrary to NPS policy that expressly prohibits development within floodplains and would therefore require a formal Statement of Findings if this alternative would be implemented. According to Director's Order #77- 2, the NPS must "avoid direct and indirect support of floodplain development and actions

that could adversely affect the natural resources and functions of floodplains or increase flood risks".

As part of the cabin rehabilitation process, utility services would be connected to the cabins. Although they would be installed below ground and would not occupy floodplain storage following construction, the vegetation and soils would be extensively disturbed as the lines are installed. Soils adjacent to Bearwallow Branch are composed of Spivey soils. These soils have a high organic content and, as such, are very susceptible to damage from vehicular traffic. As a result, extensive restoration of the floodplain of Bearwallow Branch to stabilize the streambank and reestablish vegetation would be required if Alternative F was implemented. In addition, work to restore and rehabilitate buildings in Millionaire's Row would eliminate the possibility of additional regeneration of the montane alluvial forest as well.

Soils adjacent to Bearwallow Branch are composed of Spivey soils. These soils have a high organic content and, as such, are very susceptible to damage from vehicular traffic. As a result, extensive restoration of the floodplain of Bearwallow Branch to stabilize the streambank and reestablish vegetation would be required if Alternative F was implemented. In addition, work to restore and rehabilitate buildings in Millionaire's Row would eliminate the possibility of additional regeneration of the montane alluvial forest.

One building that lies adjacent to the Little River floodplain will be removed (Young (#48). Like other alternatives that propose removal of buildings, benefits to floodplains would be experienced by reduction of impervious surfaces adjacent to floodplains.. Removing buildings in areas adjacent to floodplains would provide indirect benefits by increasing the area available for infiltration and eliminating potential future ground disturbance and soil compaction associated with residential use. Removal of the Young cabin in the floodplain would increase floodplain storage; however, the long- term effect of this action is expected to be negligible in terms of floodplain function.

4.8.2.7 Air Quality

As in the No Action Alternative, there would be a temporary increase in emissions under Alternative F due to operation of construction equipment during project implementation. Therefore, direct, adverse effects to air quality during construction would be short- term and negligible. These effects could be minimized by reducing equipment idling times, ensuring that all construction equipment is in good operating condition, and by performing construction during the time of year when ozone is least likely to form (April to September).

Visitation to the District is expected to rise following implementation of both F1 and F2 and air quality can be affected by accompanying increases in vehicular traffic and by how this traffic moves throughout the District. Increased engine idling times will generally occur as traffic congestion causes increases in travel time along roadways, within parking areas, at gates, and at destination points that are visible from the roadway, such as at wayside exhibits. As a result, projected increases in visitation would be accompanied by a lower level of service on roadways servicing the District and more emissions.

The results of an analysis was performed by the Park to evaluate the potential nitrogen deposition and nitrogen dioxide (NO2) impacts from the use of the proposed Appalachian Club and Wonderland Club parking lots show impacts very far below the nitrogen deposition threshold of 0.01 kilograms per hectare per year. In an independent air quality assessment performed by McGill Associates, based on a busy Saturday in summer, the projected increase in traffic was expected to result in an annual 8.03- ton increase in NOx emissions and a 11.31- ton increase in VOCs emissions in 2015. The increase in emissions for both pollutants is greater than 5 tons per year over the existing condition. Thus, indirect, long- term effects from Alternative F on air quality in the District would be adverse and major. Although this increase is insignificant when compared with total emissions in the Park, it is significant in terms of the VOCs and NOx that would be contributed to regional air quality degradation, as well as the immediate area of the District. Air quality in the Park region is already at unacceptable levels and has wide- ranging effects including decreased visibility, damage to vegetation, and human health problems. A comparison of emissions for the alternatives is provided in the Table 4- 8 at the end of this chapter.

4.8.3 Impacts on Interpretation and Visitor Use

4.8.3.1 Visitor Experience

Negligible, short- term direct effects to the visitor experience are anticipated to occur during implementation of Alternative F. These effects would be caused by increased noise, construction traffic, visual impacts, and degradation of air quality that could occur as a result of operating heavy machinery. Long- term, indirect effects on visitor experience are expected to be beneficial and major due to the addition of a variety of facilities and adverse and major, due to a significant increase in visitation.

The primary focus of this alternative is to provide public lodging operated by a private concessioner. The majority of the Wonderland Club, Society Hill and Millionaire's Row cabins are proposed for public lodging in both options of Alternative F. Under F2, the Wonderland Hotel would be reconstructed and the Annex restored and rehabilitated for use as public lodging and food service. Public lodging and a resource education program option would be operated by a private concessioner. This program would provide opportunities to guests staying in the Wonderland Hotel, Annex, and cabins, as well as the general public to experience education- based programs within the District and the Park. These programs would include, but not be limited to, such items as cultural resource education- based opportunities.

A variety of interpretive features and facilities are proposed under both F1 and F2. These components would provide long- term, major benefits to the visitor experience within Elkmont Historic District. Most cabins would be restored in Daisy Town and used for interpretive purposes. The Chapman cabin (#38) would be restored in Society Hill, allowing visitors to learn about Colonel Chapman's role in the establishment of the Park. An exhibit in Millionaire's Row would discuss the natural history of synchronous fireflies. The remainder of the cabins retained would be used for public lodging. Although removal of some of the buildings and restoration and preservation of others is not expected to significantly change visitor use, there would be a change in the level of interpretive efforts. Providing additional historical information in the Elkmont Nature

Trail brochure, orientation kiosk, ten wayside exhibits, and interior exhibits would create the opportunity for the visiting public to learn about the history of the Appalachian and Wonderland Clubs and train stations, the Little River Railroad Company and Colonel Townsend's role in the railroad and Elkmont's logging history, establishment and history of Elkmont, and the cultural and natural resources of the District.

In F2, the reconstructed Wonderland Hotel and restored and rehabilitated Annex would provide visitors the opportunity to stay overnight at the Hotel reconstructed to its historical configuration according to *The Secretary's Treatment Standards.*

4.8.3.2 Visitor Facilities

Visitor facilities would experience major, direct and indirect benefits as a result of implementing Alternative F. Most of the historic buildings throughout the District would be retained for a variety of uses. As discussed in Section 4.8.3.1, above, an orientation kiosk with exhibits and ten other wayside exhibits would be installed. These exhibits would provide visitors with information on the natural environment and interpret the cultural resources and the cultural landscape, while providing a historic perspective on prominent figures in Elkmont and the Park's history. Exhibits describing the natural and cultural history of the area would be placed strategically to orient visitors as they enter the District and most of the major sections of the District.

Like previous alternatives, additional benefits would be provided by the construction or repaving of six (F1) or seven (F2) parking areas in the District, repaving or widening several roads, construction of asphalt walking paths and restoration of the Appalachian Club, including interior exhibits and restroom facilities, for day use. Day use of the Appalachian Clubhouse would be operated by the concessioner and would not result in revenue for the Park to offset long- term costs associated with F1 or F2. Some of the areas in which visitors currently park are not paved and are eroded and rutted. Creation of pervious pavement lots would provide a stable surface for parking while preserving the aesthetic quality of the environment expected by the visiting public in a National Park.

The Wonderland Hotel lodging operations would be operated by a concessioner if F2 was implemented. In addition to lodging, visitors would have the option of dining at the Hotel and this service would be extended to all persons staying overnight in the cabins. The concessioner would also provide educational opportunities which would be made available to the hotel and cabin guests as part of their lodging fee. While these proposed opportunities at the Wonderland Hotel would provide a long- term direct benefit to visitor facilities, the NPS is required to first examine whether this is a necessary and appropriate use for facilities within a National Park (see discussion provided in Section 4.7.8). In addition, the decision regarding whether or not to reconstruct the hotel must follow Department of Interior guidelines. Both management policies reiterate that reconstruction can only occur upon specific written approval by the Director after a policy review at the Washington office level. If reconstruction is chosen, it would have to be undertaken in accordance with *The Secretary's Treatment Standards*, and the building would retain its status as contributing to the District even though it would not retain historic integrity of the fabric nor its authenticity (NPS 2000).

4.8.4 Impacts on Socioeconomic Environment

Alternative F would have no direct, indirect or cumulative effect on the socioeconomic environment.

4.8.4.1 Population and Environment

No direct or indirect effects on population and environment would result from implementation of Alternative F. As discussed in Section 3.4, the top local industry category includes businesses that have close ties to tourism. Recreation, accommodation and food service industries supply important service to visitors to the Park. Sevier County is one of the most popular vacation locations for people traveling within the United States. In 2003, the number of guest rooms available in Sevier County was 25,289 with hotel and motel rooms comprising 68 percent of the total. The market has indicated steady growth in cabin and condominium rentals as well (Lodging Resources, Inc. 2004).

Gatlinburg, as a gateway community, is the destination for lodging chosen by many visitors to the Park and visitation to Gatlinburg mirrors the trend of visitation to the Park. Elkmont is located in Sevier County, Tennessee. Sevier County has an estimated population of 73,703, which represents an approximate increase of 39 percent from 1990 to 2000. This increase in population is also reflected in the increased visitation to the Park and the District as well. During the past 30 years, the average number of annual visits attributed to the District has been approximately 350,000. In 2001, annual visitation to the District was approximately 375,000. Projections for visitation to the District range from a low of 409,852 in 2006 to a high of 459,023 in 2015 based on the current condition, irrespective of the alternative selected for the District (Table 3- 19). Considering the increase in visitation to the area, it is logical to conclude that additional lodging and food service accommodations would be required in the area in future years. As a result, there would be no effect on existing local populations as a result of implementing an alternative that includes pubic lodging, as is proposed in Alternative F.

4.8.4.2 Land Use

Implementation of Alternative F would indirectly result in long- term, moderate adverse effects to land use. These effects would occur through retention of a large number of buildings for public lodging and by providing a variety of additional opportunities for those uses described in the land use zone designations in the 1982 General Management Plan that would result in an increase in the visitation to the District and the internal trips within the District (see Tables 4- 6 and 4- 7). Implementation of Alternative F would continue to allow for use of public roadway corridors, accommodations at the existing quarters, and picnicking and camping at the Elkmont Campground. Historical and natural resource interpretation would be increased over that which is currently offered through installation of a variety of exhibits, retention of some buildings for interpretive uses and the Appalachian Clubhouse as a public day use rental facility and self- guiding museum. Public lodging would be provided in cabins some portions of the District and, in F2, also at the Wonderland Hotel and Annex.

These uses would be supported by alterations and additions to existing infrastructure including new parking areas, restroom facilities, electric and water connections, and an upgrade to the wastewater treatment plant. Increased visitor opportunities within the District are expected to result in land use conflicts including degradation of air quality, visual and aesthetic impacts, traffic congestion and crowding.

4.8.4.3 Access and Circulation
Alternative F would create direct, short- term, minor, adverse effects on access and circulation during construction as traffic delays are created by movement of construction vehicles to and from the District. Over the long term, major, adverse effects on traffic and circulation would occur within the District. Alternative F proposes public lodging at cabins in three areas of the District, exterior restoration of cabins for use as interpretative exhibits and overnight accommodations and dining facilities for the general public at the Wonderland Hotel (if F2 is chosen). Compared to the No Action Alternative, the estimated change in volume of trips along District roads is 1,625 per day (2,057 if F2 is chosen). A comparison of estimated change in volume of trips between alternatives is provided in the summary tables at the end of this chapter.

To alleviate potential conflicts between vehicles and pedestrians, a number of roadway modifications are included. However, even with modifications, the level of service in some areas would be reduced under Alternative F (from A to C). The Level of Service describes operational conditions within a traffic stream, with Level A representing free flow traffic, up to Level F in which traffic delays can be severe. A change from Level A to Level C would result in a decrease in average travel speed, increased percentage of time spent following and reduced headway between vehicles.

4.8.5 Impacts on Other Resources

4.8.5.1 Viewshed
Impacts to visual quality consist of changes that would alter or obstruct (1) visible landscape features from dominant viewpoints established as part of this analysis; and (2) access and visibility to dominant or important viewpoints or sequences of viewpoints. The primary viewpoints or sequences of viewpoints within the District are from existing roadways and trails. Currently, the building grounds are closed to the public and access to many of the viewpoints within the District is prohibited due to safety concerns related to the conditions of the buildings.

The established baseline for this environmental analysis and the associated visusal analysis is the No Action Alternative. This baseline identifies a naturally regenerated landscape within the study area as the condition for the visual analysis. The buildings within the study area are considered obstructions to the natural viewshed that would be removed if the General Management Plan (the No Action Alternative) was implemented. As a result, long- term, indirect, major, adverse effects would be created by retention of buildings in all areas of the District (including the reconstructed Wonderland Hotel and restored / rehabilitated Annex under F2). Retention of these buildings would adversely affect visual quality by obstructing the natural viewshed. Very little area would be available for restoration of native plant communities due to retention of the buildings and structures, as well as installation of new infrastructure components that will further degrade visual quality (parking areas, paths, electrical, sewer and water supply components Direct, adverse impacts to the District viewshed are expected to occur during implementation of Alternative F because of the presence of machinery and ground disturbance but these effects would be short- term and negligible.

The viewshed sensitivity maps shown in the Visual Quality Assessment (Appendix D) indicate the areas visible from a variety of viewpoints throughout the District. The

direct effect on the composite viewshed would also be long- term, major, and adverse under Alternative F due to retention of most buildings, structures, and cultural landscape components. Composite viewshed areas shown (Figures 7, 8 and 9, Appendix D) would also be adversely impacted by building retention with regard to the area that is visible from the transportation corridors.

4.8.5.2 Soundscape

Direct, short- term, minor adverse effects on the soundscape are expected to occur during project implementation due to construction activities. The high noise levels of combustion- powered equipment, particularly due to earth moving equipment (usually diesel), are expected to be the primary contributor to the sound levels during construction and can interfere with the ability of individuals near the work site and passersby to hear speech. Peak noise levels from construction as measured at a distance of 50 feet may vary from 70 dBA to 100 dBA. The major construction activities of this project may include removal of buildings, hauling, grading, and paving, as well as restoration and rehabilitation of buildings or construction of new facilities. Overall, construction noise is relatively short in duration and would be restricted to daytime hours at the time of year in which visitation is expected to be the lowest.

Future noise levels under Alternative F are expected to be in the 50 to 60 dBA range, with maximum levels (over short periods of time) exceeding 70 dBA for loud vehicles. As in the No Action Alternative, since these average noise levels do not exceed the noise abatement criteria of 67 dBA, Alternative F would have no long- term effect on noise in the District.

4.8.6 Impacts on NPS Operations

As is the case with all alternatives, the buildings and associated grounds would remain closed while project implementation is occurring. In addition to removal of historic buildings, Alternative F includes modifications to existing infrastructure, restoration of cabins for interpretive exhibits and restoration and rehabilitation of the Appalachian Club for day use. Reconstruction of the Wonderland Hotel in conjunction with restoration and rehabilitation of the Annex is also proposed in F2. Public lodging would be provided at all cabins retained with the exception of those in Daisy Town and the Chapman cabin (#38) in Society Hill, which would be used for interpretive purposes.

Alternative F would create indirect, adverse effects on NPS operations. The need for funds or staff to protect the buildings from vandalism or further deterioration would be increased in this alternative respective to all others previously discussed. Although maintenance of the cabins, Wonderland Hotel and Annex would be the responsibility of the concessioner, funds and staff would be required to maintain the buildings retained in Daisy Town, the Chapman cabin (#38), the interpretive exhibits, and the day use facilities at the Appalachian Clubhouse, as well as the general infrastructure (roadways, parking lots, walkways, water supply and wastewater systems). Maintenance activities would include such items as mowing, road repairs, daily cleaning and supply of public restrooms, repair of structural damage to buildings not operated by the concessioner, and general maintenance of utilities and infrastructure.

The concessions services included in Alternative F would have a direct, adverse impact on the NPS concessions management program as a result of the substantial increase in

the workload for this program. The increased workload would begin with project planning and would continue through the opening and operation of the new facilities. Concessions management would be heavily involved in planning for new facilities and services, selection of a concessioner, completion of capital improvements required, transition to a new concession contract, and overseeing actual operation by the concessioner. It is anticipated that funding would be required for a full- time GS- 9 or GS- 11 Concessions Management Specialist/Assistant to supplement the current staffing in this program of one Concessions Management Specialist. Funding for an additional vehicle, office space, and office equipment for this position would also be required.

The need for law enforcement would also increase significantly as a result of increased visitation, potential traffic and circulation problems, increased encounters with wildlife, and other emergencies that may arise. Law enforcement needs are expected to change significantly to the extent that housing and funding for a full- time ranger (level GS- 9) would be required to police the exhibits and buildings retained.

NPS would continue to manage vegetation to provide for visitor safety. Hazard trees adjacent to exhibits, trails, roadways and buildings would continue to be removed as needed to reduce the possibility that visitors could be harmed by falling trees. The indirect effect on NPS operations due to hazard tree and other vegetation management is expected to be long- term and moderately adverse because most of the District buildings and the grounds would be open to the public.

4.8.7 Cumulative Effects

Retaining most of the buildings throughout the District, in conjunction with increased visitation and the level and type of use proposed under Alternative F would essentially leave no opportunity for expansion of existing plant communities, including the globally imperiled montane alluvial forest. Montane alluvial forests are considered imperiled because only six to twenty examples of this community type are known to exist globally. In the Southern Appalachian Mountains, alluvial floodplain forests have been severely impacted and losses have occurred as a result of intensive land use and development in relatively flat and highly productive valley bottoms. Outside of the National Park, there are no assurances these areas will remain in forest. Implementation of Alternative F would result in a long- term, major, cumulative adverse effect because the opportunity to reestablish this rare plant community within the Park would be eliminated.

The impacts of implementing Alternative F on floodplains and wetlands would be primarily limited to the District and the Little River watershed. This alternative would create long- term, minor adverse effects on wetlands and floodplains by preventing the reestablishment of plant communities in areas where buildings are retained. Only six water bodies in the State of Tennessee are designated as Outstanding National Resource Waters. Four of these waters are located within the Park, one of which is the Little River. All development within the watersheds of these four water bodies is strictly regulated to prevent water quality degradation. Although water quality in the Little River and its tributaries has remained excellent, contributions of sediments from erosion or petrochemicals originating from parking area runoff can add to the existing load entering the river system. The increase in runoff anticipated under Alternative F would contribute to the adverse, cumulative effect of contaminants entering the river from surrounding communities and from other land uses within the Park.

The increased visitation and internal traffic within the District to view exhibits would create a long- term, major, adverse effect on air quality. The effect of increases in NOx and VOC emissions resulting from implementation of Alternative F is very small when compared to overall emissions in the Park and in the region. However, because the entire Park is designated a non- attainment area and a Class I area under the Clean Air Act (the highest level of air quality protection) even a small increase adds to already degraded air quality and constitutes a long- term adverse cumulative effect.

The removal of one to three contributing buildings under Alternative F is less than all other alternatives described previously. The removal of these three contributing buildings would result in a permanent, adverse effect, but the overall cumulative effect to cultural resources would be minor because most of the historic buildings would be retained throughout the District. Two of the three contributing buildings proposed for removal have already collapsed, and the third, the Wonderland Hotel Annex is in poor condition. Retention of most of the buildings and cultural landscape components would result in preservation of the only remaining representative group of buildings constructed during that period of significance in the Park.

Invasive, non- native plant species thrive in disturbance areas. The spread of invasive, non- native species could be further exacerbated by increased disturbance caused by pedestrian traffic into sensitive areas. Failing to continue an invasive, non- native species management program at Elkmont Historic District could, over time, result in the spread of those species into other areas of the Park adding exponentially to the existing adverse effects that invasive species have on the Park's botanical diversity.

In addition, cumulative adverse effects to NPS operations would also occur as a result of implementing Alternative F, primarily due to the costs of project implementation and operations within the District following project completion. Even with a projected shortfall in funding of approximately $1.1 million in 2004, every law enforcement position continues to be filled immediately so that the safety and emergency response expected by visitors is not compromised. As a result, if F1 or F2 is implemented, funding of the entire project implementation (approximately $22.5 million for F1 and $30.2 million for F2) would have to be provided from another source. Additional funds would have to be reallocated from other programs in the Park to meet maintenance and law enforcement needs. Both of these economic needs would result in long- term, major, adverse cumulative impacts on Park operations.

4.8.8 Conclusion

Implementation of Alternative F would create major impacts to native plant communities where buildings are retained, resulting in a loss of potential for the long-term recovery of these resources. Disturbances to the forested ecosystem due to the retention of buildings and associated activities under this alternative would eliminate critical biological components necessary for characteristic forest stand development over time. The specific species composition and temporal component required for the globally imperiled montane alluvial forest to become reestablished at this site would be eliminated if this alternative was implemented.

Intensive development within the floodplain and watershed of the Little River would result in increased degradation of the water quality of this designated Outstanding

National Resource Water. Other resources whose productivity would be adversely affected or limited as a result of implementing Alternative F include soils, floodplains, aquatic and terrestrial communities, wetland functional values, habitat for threatened, endangered, rare and sensitive species, and water quality. Under Alternative F, the overall long- term productivity of biotic resources would be adversely affected due to the retention of buildings, paving, installation of infrastructure, and increased visitation expected throughout the District.

Direct, long- term, major beneficial effects would be created by the retention of the Appalachian Clubhouse, the 16 Daisy Town cabins, the Chapman cabin (#38), the cabins in the Millionaire's Row and Wonderland Club areas, and the retention of many of the District's cultural landscape characteristics and features. Reconstruction of the Wonderland Hotel as a contemporary re- creation of the original building under F2 would provide direct benefits to cultural resources and to visitor use facilities. These features would also provide more opportunities for cultural resource interpretation. The expanded interpretive opportunities, providing access to trails and exhibits, and correction of erosion problems at culverts are all beneficial effects. Other areas that would benefit from Alternative F are visitor facilities and visitor experience.

Irretrievable commitments of resources would result if either F1 or F2 was implemented. In terms of NEPA impact thresholds developed for this project, these commitments would result in direct, permanent, minor adverse effects on three contributing buildings, and cultural landscape characteristics and features (mainly "spatial organization" and "buildings and structures"; see Table 3- 3) principally due to removal of buildings from the District. Indirect, moderate, adverse effects on the landscape would include wear and tear on features in the Appalachian Club and other interpretive features in Daisy Town and at the Chapman cabin (#38) due to increased internal trips to view exhibits and increased visitation.

Implementing Alternative F would result in unavoidable adverse impacts to many of the natural resources, including soils, floodplains, aquatic and terrestrial communities, wetland functional values, habitat for species of concern and water quality. These effects would occur due to retention of buildings in the floodplain, increased area of impervious surfaces, increased visitation and subsequent pedestrian traffic along with greater potential for soil compaction and damage to vegetation from trampling, loss of potential for reestablishment of montane alluvial forest and increased potential for human-wildlife encounters. Two cabins (Miller (#46) and Faust (#47)) and one garage would be retained within the 100- year floodplain under this alternative. This action would require a statement of findings and this proposed use would be contrary to National Park Service policy. There would be an irreversible commitment of resources due to elimination of up to 22 acres of potential montane alluvial forest habitat where buildings are retained.

Alternative F increases the potential for major adverse effects to archeological resources. There is also more potential for irreversible impacts to archeological resources as a result of implementation of these alternatives, but it is possible that those effects could be eliminated or minimized through proper planning and avoidance measures. The potential for adverse impacts to archeological resources increases with additional ground disturbance. The excavation required for installation of sewer, water and electrical lines is increased over all alternatives previously discussed. There is potential

for adverse effects to archeological resources as a result of implementing these alternatives, but these effects could be eliminated through proper planning and avoidance measures.

Greater visitation would result in degradation of air quality, additional wildlife habitat disturbance and wildlife / human encounters, more ground disturbance to install infrastructure components, creation of more parking spaces to accommodate increased traffic and additional costs to NPS operations for staffing and maintenance of the buildings and infrastructure, vegetation management, management and implementation of the concessions contract, and additional law enforcement to deal with the impacts of increased visitation. Increased visitation would also result in adverse effects on land use due to crowding and traffic congestion. Compared with all previous alternatives discussed, these alternatives also would provide less opportunity for benefits to native plant communities as restoration and revegetation are proposed throughout less of the District.

The proposed concession operation under F1 would allow the concessioner to rent 36 cabins and to provide the fee- based resource education options to guests as described earlier in this section. Under F2, the concessioner would have the ability to rent the cabins, as well as the reconstructed Wonderland Hotel and the Annex, and the opportunity to provide food service to all of the lodging guests and other public visitors. Day use of the Appalachian Clubhouse would be operated by the concessioner and would not result in revenue for the Park. The estimated total cost in 2007 dollars of implementing F1 is approximately $22.5 million and for F2 is $30.2 million (see Appendix C). These costs include the initial investment to modify the existing infrastructure to accommodate more visitors. Infrastructure costs are estimated at approximately $3.8 million in F1 and $4.2 million in F2. The infrastructure costs in F1 are associated with connecting cabins to the water supply and wastewater systems. The additional funds for installation of the infrastructure in F2 represent the costs of providing water, wastewater, and parking for the Wonderland Hotel. Of the total gross construction costs, approximately $6.1 million would be required to reconstruct the Hotel, restore and rehabilitate the Annex, and install the necessary infrastructure components to support the use proposed under F2 for these buildings.

As part of this planning process, the economic feasibility of F2 was examined (Lodging Resources 2004). The study indicated that the concessioner would not be able to make an initial investment in any of the capital improvements other than furniture, fixtures and equipment (FFE) necessary to run their operation and still have a reasonable opportunity to make a profit under F2. Although the study did not analyze the financial feasibility of F1, the projected income and profit in this alternative would be expected to be significantly lower since the Hotel and Annex would not be part of the concession operation. While is it possible that a concessioner could operate at a profit under F1, given that the concessioner would have 36 cabins to rent, a thorough economic analysis of this alternative would have to be completed if it is selected for implementation. The Lodging Resources study should be viewed as a preliminary review only and conclusions regarding financial feasibility as only tentative. If either Alternative F1 or F2 are selected, a more thorough analysis of the selected alternative would be required to verify the feasibility of these alternatives and to develop a concessions contract.

Per the terms of 16 USC Sec. 1a 5, and NPS *Management Policies* (2000), the NPS is responsible for determining whether or not concessions operations are necessary and appropriate "for public use and enjoyment of the National Park System in which they are located". A variety of legal policy requirements must be referenced in this analysis. Some of the considerations of these requirements include:

- the potential for adverse effects to Park resources that may be caused by a concessions operation;
- the suitability of the location proposed for commercial services and its proximity to existing services;
- the necessity of the concessions for the public to use and enjoy resources within the Park;
- the consistency of the concessions plan with conservation and preservation of natural resources;
- the ability to incorporate sustainable principles and practices in planning, sighting, construction, utility systems, selection, and recycling of building materials, and waste management;
- the ability of the concessions operation to enhance visitor use and enjoyment without causing unacceptable impacts to resources; and
- development of facilities and services restricted only to those necessary to achieve the Park's purposes.

Overnight use for the purpose of historic preservation at Elkmont was considered appropriate, however, based on the considerations listed above and other considerations found within 16 USC Sec. 1a 5 and NPS *Management Policies* (2000), the NPS has determined that the concession operations proposed in Alternative F are not necessary and appropriate and therefore, should not be implemented within the Elkmont Historic District.

4.9 Summary Tables and Impact Matrix

Tables provided in this section include supporting information for the effects discussion and compare the estimated effects of each alternative. An impact matrix (Table 4- 13) is provided as well, which includes details regarding some of the potential beneficial and adverse effects listed by resource for each alternative.

Table 4- 2: Potential Effects to Known Archeological Resources in the Elkmont Historic District

			Effect by Project Alternative							
Site	**Locus**	**Assessment**	**No Action Alternative**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternatives D1 and D2**	**Alternatives E1 and E2**	**Alternatives F1 and F2**	**Additional Work Required and/or Potential Avoidance/Mitigation Strategy**
40SV120										
	Locus A	Potentially significant resource	Potential adverse effect (a)	Potential adverse effect (a)	Potential adverse effect (a, b)	Potential adverse effect (a, b)	Potential adverse effect (a, b)	Potential adverse effect (a, b)	Potential adverse effect (a, b)	(a) Monitor and/or survey beneath buildings to be removed or rehabilitated if potential impacts to those areas. Further investigation of prehistoric deposits and/or implementation of protective measures. Avoid potentially significant historic deposits at Appalachian Clubhouse and Cabin #2. (b) Further investigation or avoidance of potentially significant historic deposits northeast of Appalachian Clubhouse.
	Locus B	Non- significant resource	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	Locus C	Potentially significant resource	Potential adverse effect (a)	Potential adverse effect (a)	Potential adverse effect (a)	Potential adverse effect (a)	Potential adverse effect (a)	Potential adverse effect (a)	Potential adverse effect (a)	(a) Avoid potentially significant historic deposits at Cabin #38. Monitor and/or survey beneath buildings as necessary.
	Locus D	Significant resource	Potential adverse effect (a)	Potential adverse effect (a)	Potential adverse effect (a)	Potential adverse effect (a)	Potential adverse effect (a)	Potential adverse effect (a)	Potential adverse effect (a, c)	(a) Complete survey around buildings and assess any additional prehistoric or historic resources. Monitor and/or survey beneath buildings as necessary. (c) Further investigation of prehistoric deposits and/or avoidance through movement/reconfiguration of Day Use/Jakes Creek Trail parking area.
	Other Areas	Unsurveyed	Potential adverse effect (a)	Potential adverse effect (a)	Potential adverse effect (a)	Potential adverse effect (a)	Potential adverse effect (a)	Potential adverse effect (a)	Potential adverse effect (a)	(a) Complete survey around buildings, and assess any additional prehistoric or historic resources. Monitor and/or survey beneath buildings as necessary.
40SV121										
	Locus A	Potentially significant resource	No effect	No effect	No effect	No effect	No effect	No effect	No effect	
	Locus B	Potentially significant resource	No effect	No effect	Potential adverse effect (d)	Potential adverse effect (d)	Potential adverse effect (d)	Potential adverse effect (d)	Potential adverse effect (d)	(d) Further investigation of prehistoric deposits, and/or avoidance through relocation of water line or use of disturbed areas along existing road or trenches.
40SV122										
	Locus A	Potentially significant resource	No effect	No effect	Potential adverse effect (e)	Potential adverse effect (e)	Potential adverse effect (e)	Potential adverse effect (e,f)	Potential adverse effect (e,f)	(e) Further investigation of prehistoric deposits and/or avoidance through movement/reconfiguration of Little River Trail parking area. (f) Further investigation of prehistoric deposits, and / or avoidance through relocation of water line.
	Locus B	Non- significant resource	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	Locus C	Non- significant resource	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	Locus D	Non- significant resource	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	Locus E	Potentially significant resource	No effect	No effect	No effect	No effect	No effect	No effect	No effect	

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Table 4- 2: (continued)

Site	Locus	Assessment	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternatives D1 and D2	Alternatives E1 and E2	Alternatives F1 and F2	Additional Work Required and/or Potential Avoidance/Mitigation Strategy
	Other Areas	Unsurveyed	Potential adverse effect (a)	Potential adverse effect (a)	Potential adverse effect (a)	Potential adverse effect (a)	Potential adverse effect (a)	Potential adverse effect (a)	Potential adverse effect (a)	(a) Complete survey around buildings, and assess any additional prehistoric or historic resources. Monitor and/or survey beneath buildings as necessary.
40SV123										
	Locus A	Potentially significant resource	No effect	No effect	No effect	No effect	No effect	No effect	No effect	
	Locus B	Potentially significant resource	Potential adverse effect (a)	Potential adverse effect (a)	Potential adverse effect (a)	Potential adverse effect (a)	Potential adverse effect (a, g)	Potential adverse effect (a, g)	Potential adverse effect (a, g)	(a) Complete survey around building, and assess any additional prehistoric or historic resources. Monitor and/or survey beneath buildings as necessary. (g) Further investigation of prehistoric deposits and/or avoidance through movement/reconfiguration of road.
40SV124										
	Locus A	Potentially significant resource	No effect	No effect	No effect	No effect	No effect	No effect	No effect	
	Locus B	Non- significant resource	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
40SV125										
	Locus A	Potentially significant resource	No effect	No effect	No effect	No effect	No effect	No effect	No effect	
	Locus B	Potentially significant resource	No effect	No effect	No effect	No effect	No effect	No effect	No effect	
	Locus C	Potentially significant resource	No effect	No effect	No effect	No effect	No effect	No effect	No effect	
	Locus D	Potentially significant resource	No effect	No effect	No effect	No effect	No effect	No effect	No effect	
	Locus E	Non- significant resource	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	Locus F	Non- significant resource	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
40SV165										
	Locus A	Non- significant resource	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
40SV166										
	Locus A	Potentially significant resource	Potential adverse effect (a)	Potential adverse effect (a)	Potential adverse effect (a)	Potential adverse effect (a)	Potential adverse effect (a, h)	Potential adverse effect (a, h)	Potential adverse effect (a, h)	(a) Complete survey around buildings, and assess any additional prehistoric or historic resources. Monitor and/or survey beneath buildings as necessary. (h) Monitor ground- disturbing activities associated with Wonderland Hotel parking lot construction.
	Locus B	Potentially significant resource	No effect	No effect	No effect	No effect	Potential adverse effect (i)	Potential adverse effect (i)	Potential adverse effect (i)	(i) Further investigation of prehistoric deposits and/or avoidance through relocation of sewer line.
	Locus C	Non- significant resource	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	Locus D	Potentially significant resource	No effect	No effect	No effect	No effect	No effect	No effect	No effect	

(a) - Structural removal, rehabilitation, or reconstruction (reconstruction for Wonderland Hotel only).
(b) - Sewer line construction between Bearwallow Branch and Jakes Creek.
(c) - Day Use/Jakes Creek Trail parking area.
(d) - Water line construction between Jakes Creek and water treatment facility.
(e) – Little River Trail parking area
(f) – Water line construction along Little River Trail
(g) - Road improvement
(h) - Wonderland Hotel parking area
(i) – Sewer line construction along road

Table 4- 3: Area Restored to Native Species and Additional Area Paved by Alternative

Alternative	Area Restored at Former Building Sites		Area Available for Reestablishment of Montane Alluvial Forest		Area Paved	
	(acres)	(hectares)	(acres)	(hectares)	(acres)	(hectares)
No Action	2.41	0.98	22	9	0	0
A	2.41	0.98	22	9	0	0
B	2.04	0.83	22	9	1.3	0.5
C	1.88	0.76	22	9	1.3	0.5
D1	1.64	0.66	12	5	1.5	0.6
D2	1.17	0.47	12	5	2.1	0.9
E1	1.44	0.58	0	0	1.5	0.6
E2	0.97	0.39	0	0	3.0	1.2
F1	0.79	0.32	0	0	2.4	1.0
F2	0.32	0.13	0	0	3.5	1.4

Table 4- 4: Roadway and Parking Area Runoff Constituents and Their Primary Sources*

Constituent	Primary Source(s)	Range of Average Concentration or Typical Loading (milligrams per liter)
Solids	Pavement wear, vehicles, atmospheric deposition, maintenance activities	437 – 508
Total Kjeldahl Nitrogen (TKN)	Atmospheric deposition, roadside fertilizer application	0.335 – 5.80
Phosphorus	Atmospheric deposition, roadside fertilizer application	0.113 – 0.202
Lead	Leaded gasoline from auto exhaust, tire wear (lead oxide filler material)	0.073 – 0.244
Zinc	Tire wear, motor oil, grease	0.056 – 0.143
Iron	Auto body rust, steel highway structures, moving engine parts	2.429 – 3.216
Copper	Metal plating, bearing and brushing wear, moving engine parts, brake lining wear, fungicides, and insecticides	0.022 – 0.723
Cadmium	Tire wear, insecticide application	0.001 – 0.005
Chromium	Metal plating, moving engine parts, brake lining wear	0.0001 – 0.004
Manganese	Moving engine parts	1.062
Sodium	Deicing salts	1.95 kg/hectare/yr
Nickel	Diesel fuel and gasoline (exhaust), lubricating oil, metal plating, bushing wear, brake lining wear, asphalt paving	0.053
Petroleum	Spills, leaks, of motor lubricants, anti- freeze and hydraulic fluids; asphalt surface leachate	**

*Concentrations taken from a report published in 1995 by the Center of Research in Water Resources, The University of Texas at Austin entitled, "A Review and Evaluation of Literature Pertaining to the Quantity and Control of Pollution from Highway Runoff and Construction, 2nd edition, Technical Report CRWR 239"
** none: a maximum contaminant level has not been established

Table 4- 5: Total Annual Rainfall Runoff (2001 Rainfall Data)

Alternative	Roadway Rainfall Runoff (mcf)*	Parking Rainfall Runoff (mcf)*	Total Rainfall Runoff (mcf)*	Increase in Pavement Runoff Compared to Existing Condition (%)
Existing Conditions	4.93	0.094	5.02	0
No Action	4.93	0.094	5.02	0
A	4.93	0.094	5.02	0
B	4.97	0.091	5.06	0.8
C	4.97	0.091	5.06	0.8
D1	5.04	0.091	5.13	2.2
D2	5.08	0.193	5.27	4.9
E1	5.11	0.193	5.30	5.6
E2	5.11	0.257	5.37	6.9
F1	5.11	0.193	5.30	5.6
F2	5.11	0.257	5.37	6.9

Source: McGill Associates 2004
* mcf – million cubic feet

Table 4- 6: Daily Trip Generation Summary

	Daily Trips by Alternative									
Trip Generator	No- Action	A	B	C	D1	D2	E1	E2	F1	F2
Trails	144	144	144	144	144	144	144	144	144	144
Campground	660	660	660	660	660	660	660	660	660	660
Backcountry	6	6	6	6	6	6	6	6	6	6
Day- Use	530	530	530	530	558	558	558	558	568	568
Hotel	0	0	0	0	0	156	0	518	0	518
Cabins	0	0	0	0	64	64	110	110	320	320
Clubhouse	0	0	64	64	66	66	75	75	81	81
Exhibits	0	0	626	919	964	964	911	911	1,380	1,380
Total Daily Trips	1,340	1,340	2,030	2,323	2,462	2,618	2,464	2,982	3,159	3,677
Internal Vehicular Trips	330	330	330	330	340	363	404	505	524	610
% Internal Capture	24.6%	24.6%	16.3%	14.2%	13.8%	13.8%	16.4%	16.4%	16.6%	16.6%
External Trips	1,010	1,010	1,700	1,993	2,122	2,255	2,060	2,477	2,635	3,067
Change in Volume of External Trips From Background	0	0	690	983	1,112	1,245	1,050	1,467	1,625	2,057

Source: McGill Associates 2004

Table 4- 7: Estimated Daily Number of Internal Trips by Alternative

Alternative	Internal Trips (Daily)	
	Two- Way Vehicular	Pedestrian
No- Action	165	431
A	165	431
B	165	435
C	165	435
D1	170	447
D2	182	479
E1	202	501
E2	253	627
F1	262	666
F2	305	775

Source: McGill Associates 2004

Table 4- 8: Estimated Air Pollutant Emissions by Alternative, Year 2015

Alternative	NO_x			VOCs		
	Total Emissions (tons/day)	Total Emissions (tons/year)	Increase over the No Action (tons/year)	Total Emissions (tons/day)	Total Emissions (tons/year)	Increase over the No Action (tons/year)
No Action	0.138	50.37	N/A	0.199	72.64	N/A
A	0.138	50.37	0	0.199	72.64	0
B	0.138	50.37	0	0.199	72.64	0
C	0.138	50.37	0	0.199	72.64	0
D1 & D2	0.146	53.29	2.92	0.210	76.65	4.01
E1 & E2	0.156	56.94	6.57	0.225	82.13	9.49
F1 & F2	0.160	58.40	8.03	0.230	83.95	11.31

Source: McGill Associates 2004

Table 4- 9: Estimated Noise Levels in the Elkmont Historic District by Alternative

Alternative	Average Range of Noise Levels (A- weighted Decibel Scale)	Maximum Noise Levels (A- weighted Decibel Scale)
No Action	35 - 60	60
A	35 - 60	60
B	50- 60	60
C	50- 60	60
D1 & D2	50- 60	70
E1 & E2	50- 60	70
F1 & F2	50- 60	70

Source: McGill Associates 2004

Table 4- 10: Projected Wastewater System Design Capacity by Alternative

Alternative	Additional Design Capacity (gallons per day)	Total Design Capacity (gallons per day)	Total Projected Peak Day Flow (gallons per day)
No Action*	None	35,000	31,300
A	None	35,000	31,300
B	None	35,000	31,300
C	None	35,000	31,300
D1	None	35,000	32,268
D2	None	35,000	33,635
E1	None	35,000	35,888
E2	5,000	40,000	44,375
F1	5,000	40,000	44,954
F2	15,000	50,000	53,467

Source: McGill Associates 2004
*represents the capacity of the existing wastewater treatment plant servicing Elkmont Campground

Table 4- 11: Estimated Discharge Pollutants by Alternative

	Flow (gallons per day)	BOD (mg/l)*	TSS (mg/l)	BOD (lbs)*	TSS (lbs)
Baseline	12,291	6.2	3.5	0.64	0.36
Alternative E2	26,666	2.9	1.6	0.64	0.36
Alternative F1	27,245	2.8	1.6	0.64	0.36
Alternative F2	35,758	2.1	1.2	0.64	0.36

Source: McGill Associates 2004
*mg/l = milligrams per liter
lbs = pounds

Table 4- 12: Annualized Average Constituent Loading for Alternative F2

Constituent	Concentration Based Loading to Stream (mg/l)	Concentration Based Loading in Stream (mg/l)	Water Supply Maximum Contaminant Level (mg/l)
Solids	437	2.3225570	none *
Total Kjeldahl Nitrogen	0.335	0.0017804	10.0
Phosphorus	0.113	0.0006006	none *
Lead	0.073	0.0003880	0.05
Zinc	0.056	0.0002976	5.0
Iron	2.429	0.0129096	0.3
Copper	0.022	0.0001169	1.0
Cadmium	0.001	0.0000053	0.01
Chromium	0.0001	0.0000005	0.05
Manganese	1.062	0.0056443	0.05
Sodium	n/a	n/a	none *
Nickel	0.053	0.0002817	250
Petroleum	2.7	0.0143499	none *

Source: McGill Associates 2004
* a maximum contaminant level is currently not established
mg/l = milligrams per liter

Table 4- 13: List of Potential Effects (per NEPA) by Alternative

RESOURCE	ALTERNATIVE									
	No Action	A	B	C	D1	D2	E1	E2	F1	F2
CULTURAL RESOURCES										
Buildings	Direct, permanent, major, adverse—49 contributing buildings removed; no indirect or beneficial effects	Direct, permanent, major, adverse—49 contributing buildings removed; no indirect or beneficial effects	Direct, permanent, major, adverse—36 contributing buildings removed; indirect, permanent, minor, adverse—increased visitation, traffic, wear and tear; direct, long-term, minor to major, beneficial—retention of some buildings, and treatment measures according to *The Secretary's Treatment Standards*	Direct, permanent, major, adverse—31 contributing buildings removed; indirect, permanent, minor, adverse—increased visitation, traffic, wear and tear; direct, long-term, minor to major, beneficial—retention of some buildings, and treatment measures according to *The Secretary's Treatment Standards*	Direct, permanent, major, adverse—24 contributing buildings removed; indirect, permanent, minor, adverse—increased visitation, traffic, wear and tear; direct, long-term, minor to major, beneficial—retention of some buildings, and treatment measures according to *The Secretary's Treatment Standards*	Direct, permanent, major, adverse—22 contributing buildings removed; indirect, permanent, minor, adverse—increased visitation, traffic, wear and tear; direct, long-term, minor to major, beneficial—retention of some buildings (Wonderland Hotel reconstructed and Annex restored and rehabilitated), and treatment measures according to *The Secretary's Treatment Standards*	Direct, permanent, moderate, adverse—19 contributing buildings removed; indirect, permanent, moderate, adverse—increased visitation, traffic, wear and tear; direct, long-term, minor to major, beneficial—retention of many buildings, and treatment measures according to *The Secretary's Treatment Standards*	Direct, permanent, moderate, adverse—17 contributing buildings removed; indirect, permanent, moderate, adverse—increased visitation, traffic, wear and tear; direct, long-term, minor to major, beneficial—retention of many buildings (Wonderland Hotel reconstructed and Annex restored and rehabilitated), and treatment measures according to *The Secretary's Treatment Standards*	Direct, permanent, minor, adverse—three contributing buildings removed; indirect, permanent, moderate, adverse—increased visitation, traffic, wear and tear; direct, long-term, minor to major, beneficial—retention of most buildings, and treatment measures according to *The Secretary's Treatment Standards*	Direct, permanent, minor, adverse—one contributing building removed; indirect, permanent, moderate, adverse—increased visitation, traffic, wear and tear; direct, long-term, minor to major, beneficial—retention of most buildings (Wonderland Hotel reconstructed and Annex restored and rehabilitated), and treatment measures according to *The Secretary's Treatment Standards*
Cultural Landscape	Direct, permanent, major, adverse—loss of landscape characteristics and features due to removal of buildings; no indirect effects; direct, long- term, minor, beneficial—retention of a few landscape characteristics and features	Direct, permanent, major, adverse—loss of most landscape characteristics and features due to removal of buildings; no indirect effects; direct, long- term, minor, beneficial—retention of a few landscape characteristics and features	Direct, permanent, moderate, adverse—loss of landscape characteristics and features due to removal of buildings; indirect, long- term, minor, adverse—increased visitation, traffic, wear and tear; direct, long- term, minor, beneficial—retention of some landscape characteristics and features	Direct, permanent, moderate, adverse—loss of landscape characteristics and features due to removal of buildings; indirect, long- term, minor, adverse—increased visitation, traffic, wear and tear; direct, long- term, minor, beneficial—retention of some landscape characteristics and features	Direct, permanent, moderate, adverse—loss of landscape characteristics and features due to removal of buildings; indirect, long- term, minor, adverse—increased visitation, traffic, wear and tear; direct, long- term, minor, beneficial—retention of some landscape characteristics and features	Direct, permanent, moderate, adverse—loss of landscape characteristics and features due to removal of buildings; indirect, long- term, minor, adverse—increased visitation, traffic, wear and tear; direct, long- term, minor, beneficial—retention of some landscape characteristics and features	Direct, permanent, moderate, adverse—lesser loss of landscape characteristics and features due to removal of fewer buildings; indirect, long- term, moderate, adverse—increased visitation, traffic, wear and tear; direct, long-term, minor, beneficial—retention of more landscape characteristics and features	Direct, permanent, moderate, adverse—lesser loss of landscape characteristics and features due to removal of fewer buildings; indirect, long- term, moderate, adverse—increased visitation, traffic, wear and tear; direct, long-term, minor, beneficial—retention of more landscape characteristics and features	Direct, permanent, minor, adverse—minimal loss of landscape characteristics and features due to removal of small number of buildings; indirect, long- term, moderate, adverse—increased visitation, traffic, wear and tear; direct, long-term, minor, beneficial—retention of most landscape characteristics and features	Direct, permanent, minor, adverse—minimal loss of landscape characteristics and features due to removal of small number of buildings; indirect, long- term, moderate, adverse—increased visitation, traffic, wear and tear; direct, long-term, minor, beneficial—retention of most landscape characteristics and features
Archeology	Direct, permanent, potentially major adverse or no effect if resource is avoided; up to 1 significant locus, 4 potentially significant loci, and two unsurveyed areas would be adversely affected	Direct, permanent, potentially major adverse or no effect if resource is avoided; up to 1 significant locus, 4 potentially significant loci, and two unsurveyed areas would be adversely affected	Direct, permanent, potentially major adverse or no effect if resource is avoided; up to 1 significant locus, 6 potentially significant loci, and two unsurveyed areas would be adversely affected	Direct, permanent, potentially major adverse or no effect if resource is avoided; up to 1 significant locus, 6 potentially significant loci, and two unsurveyed areas would be adversely affected	Direct, permanent, potentially major adverse or no effect if resource is avoided; up to 1 significant locus, 7 potentially significant loci, and two unsurveyed areas would be adversely affected	Direct, permanent, potentially major adverse or no effect if resource is avoided; up to 1 significant locus, 7 potentially significant loci, and two unsurveyed areas would be adversely affected	Direct, permanent, potentially major adverse or no effect if resource is avoided; up to 1 significant locus, 7 potentially significant loci, and two unsurveyed areas would be adversely affected	Direct, permanent, potentially major adverse or no effect if resource is avoided; up to 1 significant locus, 7 potentially significant loci, and two unsurveyed areas would be adversely affected	Direct, permanent, potentially major, adverse or no effect if resource is avoided; up to 1 significant locus, 7 potentially significant loci, and two unsurveyed areas would be adversely affected	Direct, permanent, potentially major, adverse or no effect if resource is avoided; up to 1 significant locus, 7 potentially significant loci, and two unsurveyed areas would be adversely affected

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Table 4-13: (continued)

RESOURCE	ALTERNATIVE									
	No Action	A	B	C	D1	D2	E1	E2	F1	F2
NATURAL RESOURCES										
Soils	Direct, short-term negligible adverse effects during construction; Indirect, long-term, major beneficial effects due soil stabilization provided by reestablishment native plant communities and control of non-native species	Direct, short-term negligible adverse effects during construction; Indirect, long-term, major beneficial effects due soil stabilization provided by reestablishment native plant communities and control of non-native species	Direct, short-term moderate adverse effects during construction; Indirect, long-term, moderate beneficial effects due soil stabilization provided by restoration of native plant communities	Direct, short-term moderate adverse effects during construction; Indirect, long-term, minor, adverse resulting from net increase in runoff	Direct, short-term moderate, adverse effects during construction; Indirect, long-term, moderate, beneficial effects due soil stabilization provided by restoration of native plant communities	Direct, short-term moderate, adverse effects during construction; Indirect, long-term, moderate, beneficial effects due soil stabilization provided by restoration of native plant communities	Direct, short-term major adverse effects during construction; Indirect, long-term, moderate adverse effects due to increased impervious surfaces, runoff, and pedestrian and vehicular traffic	Direct, short-term major adverse effects during construction; Indirect, long-term, moderate adverse effects due to increased impervious surfaces, runoff, and pedestrian and vehicular traffic	Direct, short-term moderate adverse effects during construction; Indirect, long-term, moderate adverse effects due to increased impervious surfaces, runoff, and pedestrian and vehicular traffic	Direct, short-term moderate adverse effects during construction; Indirect, long-term, moderate adverse effects due to increased impervious surfaces, runoff, and pedestrian and vehicular traffic
Terrestrial Communities	Direct, short-term, negligible adverse effects during construction due to use of heavy machinery; Indirect, long-term, major beneficial effects due to potential for expansion of montane alluvial forest and wildlife habitat	Direct, short-term, minor adverse effects during construction due to use of heavy machinery; Indirect, long-term, major beneficial effects due to potential for expansion of montane alluvial forest and wildlife habitat	Direct, short-term, negligible, adverse effects during construction due to use of heavy machinery; Indirect, long-term, major beneficial effects due to potential for expansion of montane alluvial forest and wildlife habitat; long-term, minor, adverse effect due to increased hazard tree management	Direct, short-term, negligible adverse effects during construction due to use of heavy machinery; Indirect, long-term, major beneficial effects due to potential for expansion of montane alluvial forest and wildlife habitat; long-term, minor, adverse effect due to increased hazard tree management	Direct, short-term, moderate, adverse effects during construction due to soil disturbance; Indirect, long-term, negligible benefit due to potential for expansion of forest communities over; long-term, moderate, adverse effect due to increased hazard tree management and other activities in montane alluvial forest habitat	Direct, short-term, moderate, adverse effects during construction due to soil disturbance; Indirect, long-term, negligible benefit due to potential for expansion of forest communities; long-term, moderate, adverse effect due to increased hazard tree management and other activities in montane alluvial forest habitat	Direct, short-term, moderate adverse effects during construction due to soil disturbance; Indirect, long-term, minor, adverse effects due to loss of forest communities; potential for chronic disturbance increased due to proposed lodging; long-term, major, adverse effect due to increased hazard tree management and other activities in montane alluvial forest habitat	Direct, short-term, moderate adverse effects during construction due to soil disturbance; Indirect, long-term, minor, adverse effects due to loss of forest communities; potential for chronic disturbance increased due to proposed lodging; long-term, major, adverse effect due to increased hazard tree management and other activities in montane alluvial forest habitat	Direct, short-term, moderate adverse effects during construction due to soil disturbance; Indirect, long-term, minor, adverse effects due to loss of forest communities; potential for chronic disturbance increased due to proposed lodging; long-term, major, adverse effect due to increased hazard tree management and other activities in montane alluvial forest habitat	Direct, short-term, moderate adverse effects during construction due to soil disturbance; Indirect, long-term, minor, adverse effects due to loss of forest communities; potential for chronic disturbance increased due to proposed lodging; long-term, major, adverse effect due to increased hazard tree management and other activities in montane alluvial forest habitat
Aquatic Communities	Direct, short-term, negligible adverse effects during construction due to use of heavy machinery and increased erosion potential; Indirect, long-term, minor beneficial effects due to increase in soil stabilization and reduced erosion potential	Direct, short-term, negligible adverse effects during construction due to use of heavy machinery and increased erosion potential; Indirect, long-term, minor beneficial effects due to increase in soil stabilization and reduced erosion potential	Direct, short-term, negligible adverse effects during construction due to use of heavy machinery and increased erosion potential; Indirect, long-term, minor beneficial effects due to increase in soil stabilization and reduced erosion potential	Direct, short-term, negligible adverse effects during construction due to use of heavy machinery and increased erosion potential; Indirect, long-term, minor beneficial effects due to increase in soil stabilization and reduced erosion potential	Direct, short-term, negligible adverse effects during construction due to use of heavy machinery and increased erosion potential; Indirect, minor, long-term, and adverse from increase in impermeable surfaces and runoff into surface waters and potential for deposition of petrochemicals into adjacent waterways.	Direct, short-term, negligible adverse effects during construction due to use of heavy machinery and increased erosion potential; Indirect, minor, long-term, and adverse from increase in impermeable surfaces and runoff into surface waters and potential for deposition of petrochemicals into adjacent waterways.	Direct, short-term, negligible adverse effects during construction due to use of heavy machinery and increased erosion potential; Indirect, minor, long-term, and adverse from increase in impermeable surfaces and runoff into surface waters and potential for deposition of petrochemicals into adjacent waterways.	Direct, short-term, negligible adverse effects during construction due to use of heavy machinery and increased erosion potential; Indirect, minor, long-term, and adverse from increase in impermeable surfaces and runoff into surface waters and potential for deposition of petrochemicals into adjacent waterways.	Direct, short-term, negligible adverse effects during construction due to use of heavy machinery and increased erosion potential; Indirect, minor, long-term, and adverse from increase in impermeable surfaces and runoff into surface waters and potential for deposition of petrochemicals into adjacent waterways.	Direct, short-term, negligible adverse effects during construction due to use of heavy machinery and increased erosion potential; Indirect, minor, long-term, and adverse from increase in impermeable surfaces and runoff into surface waters and potential for deposition of petrochemicals into adjacent waterways.

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Table 4-13: (continued)

RESOURCE	ALTERNATIVE									
	No Action	A	B	C	D1	D2	E1	E2	F1	F2
NATURAL RESOURCES										
Wetland Communities and Functional Values	Direct, short-term minor adverse effects during construction; long-term, indirect, moderate beneficial effects due to removal of buildings adjacent to wetlands; Flood storage, fish and shellfish habitat, recreation, wildlife habitat, aesthetics/visual quality functions would benefit	Direct, short-term minor adverse effects during construction; long-term, indirect, moderate beneficial effects due to removal of buildings adjacent to wetlands; Flood storage, fish and shellfish habitat, recreation, wildlife habitat, aesthetics/visual quality functions would benefit	Direct, short-term minor adverse effects during construction; long-term, indirect, minor beneficial effects due to removal of buildings adjacent to wetlands; Flood storage, fish and shellfish habitat, recreation, wildlife habitat, aesthetics/visual quality functions would benefit	Direct, short-term minor adverse effects during construction; long-term, indirect, moderate beneficial effects due to removal of buildings adjacent to wetlands; Flood storage, fish and shellfish habitat, recreation, wildlife habitat, aesthetics/visual quality functions would benefit	Direct, short-term minor adverse effects during construction; long-term, indirect, minor beneficial effects due to removal of buildings adjacent to wetlands; Flood storage, fish and shellfish habitat, recreation, wildlife habitat, aesthetics/visual quality functions would benefit	Direct, short-term minor adverse effects during construction; long-term, indirect, minor beneficial effects due to removal of buildings adjacent to wetlands; Flood storage, fish and shellfish habitat, recreation, wildlife habitat, aesthetics/visual quality functions would benefit	Direct, short-term minor adverse effects during construction; Indirect, short-term negligible adverse effects during construction; long-term, indirect minor, adverse effects due to retention of buildings and paving of parking areas adjacent to wetlands.	Direct, short-term minor adverse effects during construction; Indirect, short-term negligible adverse effects during construction; long-term, indirect minor, adverse effects due to retention of buildings and paving of parking areas adjacent to wetlands.	Direct, short-term minor adverse effects during construction; Indirect, short-term negligible adverse effects during construction; long-term, indirect minor, adverse effects due to retention of buildings and paving of parking areas adjacent to wetlands.	Direct, short-term minor adverse effects during construction; Indirect, short-term negligible adverse effects during construction; long-term, indirect minor, adverse effects due to retention of buildings and paving of parking areas adjacent to wetlands.
Threatened, Endangered, Sensitive and Rare Species	Federal-listed species: No direct effect; State-listed species: Direct, short term, adverse effects during construction; Indirect long-term minor benefits due to expansion of chamomile grapefern, butternut and Fraser's sedge habitat	Federal-listed species: No direct effect; State-listed species: Direct, short term, adverse effects during construction; Indirect long-term minor benefits due to expansion of chamomile grapefern, butternut and Fraser's sedge habitat	Federal-listed species: No direct effect; State-listed species: Direct, short term, adverse effects during construction; Indirect long-term minor benefits due to expansion of chamomile grapefern, butternut and Fraser's sedge habitat	Federal-listed species: No direct effect; State-listed species: Direct, short term, adverse effects during construction; Indirect long-term minor benefits due to expansion of chamomile grapefern, butternut and Fraser's sedge habitat	Federal-listed species: No direct effect; Long-term, indirect negligible benefits due to expansion of potential habitat State-listed species: (chamomile grapefern, butternut and Fraser's sedge)	Federal-listed species: No direct effect; Long-term, indirect negligible benefits due to expansion of potential habitat State-listed species: (chamomile grapefern, butternut and Fraser's sedge)	Federal-listed species: No effect; State-listed species: Long-term, indirect moderate, adverse due to increased visitation, pedestrian and vehicular traffic and potential for chronic disturbance to existing plant communities.	Federal-listed species: No effect; State-listed species: Long-term, indirect moderate, adverse due to increased visitation, pedestrian and vehicular traffic and potential for chronic disturbance to existing plant communities.	Federal-listed species: No effect; State-listed species: Long-term, indirect moderate, adverse due to increased visitation, pedestrian and vehicular traffic and potential for chronic disturbance to existing plant communities.	Federal-listed species: No effect; State-listed species: Long-term, indirect moderate, adverse due to increased visitation, pedestrian and vehicular traffic and potential for chronic disturbance to existing plant communities.
Water Quality	Direct, short-term, negligible adverse effects due to increased potential for runoff and sedimentation during construction; Indirect, long-term minor beneficial effects from increased area available for infiltration (2.41 acres)	Direct, short-term, minor, adverse effects due to increased potential for runoff and sedimentation during construction; Indirect, long-term minor beneficial effects from increased area available for infiltration (2.41 acres)	Direct, short-term, negligible, adverse effects due to increased potential for runoff and sedimentation during construction; Indirect, long-term minor beneficial effects from increased area available for infiltration (2.04 acres)	Direct, short-term, negligible, adverse effects due to increased potential for runoff and sedimentation during construction; Indirect, long-term minor beneficial effects from increased area available for infiltration (1.88 acres)	Short-term, negligible adverse effects due to increased potential for runoff and sedimentation during construction; Long-term minor beneficial effects from increased area available for infiltration (1.64 acres)	Short-term, negligible adverse effects due to increased potential for runoff and sedimentation during construction; Long-term negligible beneficial effects from increased area available for infiltration (1.17 acres), due to overall net increase in impervious surfaces	Short-term, minor, adverse effects due to increased potential for runoff and sedimentation during construction; Long-term minor adverse effects resulting from increased impervious surfaces, net loss of area available for infiltration and associated runoff	Short-term, minor, adverse effects due to increased potential for runoff and sedimentation during construction; Long-term minor adverse effects resulting from increased impervious surfaces, net loss of area available for infiltration and associated runoff	Short-term, minor, adverse effects due to increased potential for runoff and sedimentation during construction; Long-term minor adverse effects resulting from increased impervious surfaces, net loss of area available for infiltration and associated runoff	Short-term, minor, adverse effects due to increased potential for runoff and sedimentation during construction; Long-term minor adverse effects resulting from increased impervious surfaces, net loss of area available for infiltration and associated runoff

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Table 4- 13: (continued)

RESOURCE	ALTERNATIVE									
	No Action	A	B	C	D1	D2	E1	E2	F1	F2
NATURAL RESOURCES (continued)										
Floodplains	No direct effects; permanent, indirect, moderate beneficial effects due to removal of buildings from floodplain	No direct effects; permanent, indirect, moderate beneficial effects due to removal of buildings from floodplain	No direct effects; permanent, indirect, moderate beneficial effects due to removal of buildings from floodplain	No direct effects; permanent, indirect, moderate beneficial effects due to removal of buildings from floodplain	No direct effects; Indirect, short- term negligible adverse effects during construction; permanent, indirect, moderate beneficial effects due to removal of buildings from floodplain	No direct effects; Indirect, short- term negligible adverse effects during construction; permanent, indirect, moderate beneficial effects due to removal of buildings from floodplain	Direct, short- term minor, adverse effects during construction; indirect, permanent, minor adverse effects due to retention of buildings within and adjacent to floodplain	Direct, short- term minor, adverse effects during construction; indirect, permanent, minor adverse effects due to retention of buildings within and adjacent to floodplain	Direct, short- term minor, adverse effects during construction; indirect, permanent, moderate, adverse effects due to retention of buildings within and adjacent to floodplain	Direct, short- term minor, adverse effects during construction; Indirect, permanent, moderate, adverse effects due to retention of buildings within and adjacent to floodplain
Air Quality	Direct, short- term, negligible, adverse effect during construction; no long- term direct or indirect effects NOx = 50.37 tons/yr VOCs=72.64 tons/yr	Direct, short- term, negligible, adverse effect during construction; no long- term direct or indirect effects NOx = 50.37 tons/yr VOCs=72.64 tons/yr	Direct, short- term, negligible, adverse effect during construction; no long- term direct or indirect effects NOx = 50.37 tons/yr VOCs=72.64 tons/yr	Direct, short- term, negligible, adverse effect during construction; no long- term direct or indirect effects NOx = 50.37 tons/yr VOCs=72.64 tons/yr	Direct, short- term, negligible, adverse effect during construction; long- term, indirect , minor, adverse effect NOx = 53.29 tons/yr VOCs=76.65 tons/yr	Direct, short- term, negligible, adverse effect during construction; long- term, indirect , minor, adverse effect NOx = 53.29 tons/yr VOCs=76.65 tons/yr	Direct, short- term, negligible, adverse effect during construction; long- term, indirect , moderate, adverse effect NOx = 56.94 tons/yr VOCs=82.13 tons/yr	Direct, short- term, negligible, adverse effect during construction; long- term, indirect , moderate, adverse effect NOx = 56.94 tons/yr VOCs=82.13 tons/yr	Direct, short- term, negligible, adverse effect during construction; long- term, indirect , major, adverse effect NOx = 58.40 tons/yr VOCs=83.95 tons/yr	Direct, short- term, negligible, adverse effect during construction; long- term, indirect , major, adverse effect NOx = 56.94 tons/yr VOCs=82.13 tons/yr
INTERPRETATION AND VISITOR USE										
Visitor Experience and Visitor Facilities	Direct, short- term, negligible adverse effects during construction; Indirect, long- term, major benefits due to building removal and increased safety	Direct, short- term, negligible adverse effects during construction; Indirect, long- term, major benefits due to building removal and increased safety	Direct, short- term, negligible adverse effects during construction; Indirect, long- term, minor to moderate benefits due to building removal, increased safety, and additional interpretive features	Direct, short- term, adverse effects during construction; Indirect, long- term, moderate benefits due to increased safety, and additional interpretive features	Direct, long- term, major, beneficial major benefits due to increased visitor safety and addition of interpretive features	Direct, long- term, major, beneficial major benefits due to increased visitor safety and addition of interpretive features	Direct, short- term, negligible adverse effects during construction; Indirect, long- term, major adverse effects on visitor experience due to considerable increase in visitation; Indirect, long- term, major benefits due to addition of a variety of visitor facilities	Direct, short- term, negligible adverse effects during construction; Indirect, long- term, major adverse effects on visitor experience due to considerable increase in visitation; Indirect, long- term, major benefits due to addition of a variety of visitor facilities	Direct, short- term, negligible adverse effects during construction; Indirect, long- term, major adverse effects on visitor experience due to considerable increase in visitation; Indirect, long- term, major benefits due to addition of a variety of visitor facilities	Direct, short- term, negligible adverse effects during construction; Indirect, long- term, major adverse effects on visitor experience due to considerable increase in visitation; Indirect, long- term, major benefits due to addition of a variety of visitor facilities

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Table 4- 13: (continued)

RESOURCE	ALTERNATIVE									
	No Action	A	B	C	D1	D2	E1	E2	F1	F2
SOCIOECONOMIC ENVIRONMENT										
Land Use	No direct effects; indirect, long- term, minor, beneficial effects due to opening grounds	No direct effects; indirect, long- term, minor, beneficial effects due to opening grounds	No direct effects; indirect, long- term, moderate, beneficial effects due to opening grounds and increased interpretive opportunities	No direct effects; indirect, long- term, moderate, beneficial effects due to opening grounds and increased interpretive opportunities	No direct effects; indirect, long- term, moderate, beneficial effects due to opening grounds and increased interpretive opportunities and visiting scientist housing	No direct effects; indirect, long- term, moderate, beneficial effects due to opening grounds and increased interpretive opportunities, curatorial facility, and visiting scientist housing	No direct effects; indirect, long- term, moderate, adverse effects due to crowding and traffic congestion caused by increased visitation to interpretive exhibits, lodging cabins and visiting scientist housing	No direct effects; indirect, long- term, moderate, adverse effects due to crowding and traffic congestion caused by increased visitation to interpretive exhibits, lodging cabins, Hotel and Annex and visiting scientist housing	No direct effects; indirect, long- term, moderate, adverse effects due to crowding and traffic congestion caused by increased visitation to interpretive exhibits, and lodging cabins	No direct effects; indirect, long- term, moderate, adverse effects due to crowding and traffic congestion caused by increased visitation to interpretive exhibits, lodging cabins, Hotel and Annex
Access and Circulation	Direct, short- term negligible adverse effects during construction; No long- term effects.	Direct, short- term negligible adverse effects during construction; No long- term effects.	Direct, short- term negligible adverse effects during construction; Indirect, long- term moderate benefits due to repair of damaged roadways and walkways	Direct, short- term negligible adverse effects during construction; Indirect, long- term moderate benefits due to repair of damaged roadways	Direct, short- term minor adverse effects during construction; Indirect, long- term moderately adverse due to considerable increase in traffic and associated increase in operation and maintenance costs	Direct, short- term minor adverse effects during construction; Indirect, long- term moderately adverse due to considerable increase in traffic and associated increase in operation and maintenance costs	Direct, short- term minor adverse effects during construction; Indirect, long- term major adverse due to considerable increase in traffic, need for pedestrian safety measures and associated increase in operation and maintenance costs	Direct, short- term minor adverse effects during construction; Indirect, long- term major adverse due to considerable increase in traffic, need for pedestrian safety measures and associated increase in operation and maintenance costs	Direct, short- term minor adverse effects during construction; Indirect, long- term major adverse due to considerable increase in traffic, need for pedestrian safety measures and associated increase in operation and maintenance costs	Direct, short- term minor adverse effects during construction; Indirect, long- term major adverse due to considerable increase in traffic, need for pedestrian safety measures and associated increase in operation and maintenance costs
VIEWSHED	Direct, short- term, negligible adverse effects during construction; Indirect, long- term, major benefits due to removal of buildings and structures; indirect long- term, minor, adverse effects due to retention of cultural landscape components	Direct, short- term, negligible adverse effects during construction; Indirect, long- term, major benefits due to removal of buildings, structures, and cultural landscape components	Direct, short- term, negligible adverse effects during construction; Indirect, long- term, minor, adverse effects due to retention of buildings, structures and cultural landscape components; indirect, long- term, minor benefits due to removal of buildings in most areas of the District	Direct, short- term, negligible adverse effects during construction; Indirect, long- term, minor, adverse effects due to retention of buildings, structures and cultural landscape components; indirect, long- term, minor benefits due to removal of buildings in most areas of the District	Direct, short- term, negligible adverse effects during construction; Indirect, long- term, moderate, adverse effects due to retention of buildings, structures and cultural landscape components; indirect, long- term, minor benefits due to removal of buildings in some areas of the District	Direct, short- term, negligible adverse effects during construction; Indirect, long- term, moderate, adverse effects due to retention of buildings, structures and cultural landscape components (and reconstructed Wonderland Hotel and restored / rehabilitated Annex); indirect, long- term, minor benefits due to removal of buildings in some areas of the District	Direct, short- term, negligible adverse effects during construction; Indirect, long- term, major, adverse effects due to retention of buildings, structures and cultural landscape components; indirect, long- term, negligible benefits due to removal of buildings in some areas of the District	Direct, short- term, negligible adverse effects during construction; Indirect, long- term, major, adverse effects due to retention of buildings, structures and cultural landscape components (and reconstructed Wonderland Hotel and restored / rehabilitated Annex); indirect, long- term, negligible benefits due to removal of some buildings	Direct, short- term, negligible adverse effects during construction; Indirect, long- term, major, adverse effects due to retention of most buildings, structures and cultural landscape components; indirect, long- term, negligible benefits due to removal of buildings in some areas of the District	Direct, short- term, negligible adverse effects during construction; Indirect, long- term, major, adverse effects due to retention of buildings, structures and cultural landscape components (and reconstructed Wonderland Hotel and restored / rehabilitated Annex); indirect, long- term, negligible benefits due to removal of some buildings

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Table 4- 13: (continued)

RESOURCE	ALTERNATIVE									
	No Action	A	B	C	D1	D2	E1	E2	F1	F2
SOUNDSCAPE	Direct, short- term, minor, adverse effect during construction; no long- term effects 35–60 dBA average 60 dBA maximum	Direct, short- term, minor, adverse effect during construction; no long- term effects 35–60 dBA average 60 dBA maximum	Direct, short- term, minor, adverse effect during construction; no long- term effects 50–60 dBA average 60 dBA maximum	Direct, short- term, minor, adverse effect during construction; no long- term effects 50–60 dBA average 60 dBA maximum	Direct, short- term, minor, adverse effect during construction; no long- term effects 50–60 dBA average 70 dBA maximum	Direct, short- term, minor, adverse effect during construction; no long- term effects 50–60 dBA average 70 dBA maximum	Direct, short- term, minor, adverse effect during construction; no long- term effects 50–60 dBA average 70 dBA maximum	Direct, short- term, minor, adverse effect during construction; no long- term effects 50–60 dBA average 70 dBA maximum	Direct, short- term, minor, adverse effect during construction; no long- term effects 50–60 dBA average 70 dBA maximum	Direct, short- term, minor, adverse effect during construction; no long- term effects 50–60 dBA average 70 dBA maximum
NPS OPERATIONS	No direct effects: Indirect, permanent major benefits due to elimination of need to maintain historic buildings	No direct effects: Indirect, permanent major benefits due to elimination of need to maintain historic buildings	No direct effects: Indirect, permanent moderate benefits due to elimination of maintenance needs for some historic buildings; long- term, minor, adverse effects due to increased need for vegetation management	No direct effects: Indirect, permanent moderate benefits due to elimination of maintenance needs for some historic buildings; long- term, minor, adverse effects due to increased need for vegetation management	No direct effects: Indirect, permanent moderate benefits due to elimination of maintenance needs for some historic buildings; long- term, moderate, adverse effects due to increased need for vegetation management	Indirect, permanent, major adverse effects due to additional cost associated with law enforcement, maintenance of buildings retained, including visiting scientist temporary housing and maintenance and staffing of curatorial storage facility; long- term, moderate, adverse effects due to increased need for vegetation management	Indirect, permanent, major adverse effects due to additional cost associated with law enforcement, maintenance, visiting scientist temporary housing and management of concessions contract; long- term, moderate, adverse effects due to increased need for vegetation management	Indirect, permanent, major adverse effects due to additional cost associated with law enforcement, maintenance, visiting scientist temporary housing and management of concessions contract; long- term, moderate, adverse effects due to increased need for vegetation management	Indirect, permanent, major adverse effects due to additional cost associated with law enforcement, maintenance, and management of concessions contract; long- term, moderate, adverse effects due to increased need for vegetation management	Indirect, permanent, major adverse effects due to additional cost associated with law enforcement, maintenance, and management of concessions contract; long- term, moderate, adverse effects due to increased need for vegetation management

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4.10 Compliance with Federal and State Laws, Executive Orders, and Regulations

Compliance with federal and state laws, Executive Orders and regulations, as well as NPS policies is described in detail in Section 2.1 of this document. This section provides an overview of the alternatives development process, methods to comply with NEPA and the NHPA and the public participation process that is integral to the processes defined by these laws. In addition to federal legislation, compliance with a variety of Director's Orders is discussed as well.