



Elkmont Historic District

Final Environmental Impact Statement and General Management Plan Amendment

Volume 1

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Final Environmental Impact Statement and
General Management Plan Amendment
for the
Elkmont Historic District

Great Smoky Mountains National Park
North Carolina and Tennessee

Great Smoky Mountains National Park was authorized by Congress on May 22, 1926, and was officially established on June 25, 1934, to preserve one of the last remnants of relatively undeveloped land in the southern Appalachian Mountains and to provide a national park for populations living east of the Mississippi River. Unlike most western national parks that were created from federally held lands, Great Smoky Mountains National Park required lands to be purchased from private property owners. Elkmont properties were purchased in the 1920s and 1930s and through a series of leases were occupied until 1992, 1996, and 2001.

The last *General Management Plan* for the park was completed in January 1982. The 1982 plan calls for the removal of all buildings at Elkmont under private lease upon the expiration of those leases and for building sites to be returned to a natural state. In 1993, buildings within Elkmont were determined eligible for listing in the National Register of Historic Places, and in 1994 Elkmont was placed on the National Register as a historic district. This Environmental Impact Statement was initiated to investigate alternatives to complete removal of all buildings at Elkmont and to possibly amend the 1982 plan.

This document examines seven alternatives for managing the Elkmont Historic District for the next 15 to 20 years, including a no-action alternative. It also analyzes the impacts of implementing each of the alternatives. The “no-action” alternative is the 1982 *General Management Plan* and serves as a basis for comparison in evaluating the other alternatives. **Alternatives A through F** assess a range of options for the district from complete removal of all buildings to preservation and rehabilitation of all but one of the contributing buildings and most of the non-contributing buildings for operation as a restaurant and to provide overnight lodging. Natural resources preservation and restoration also depend on the specific alternative and range from complete restoration to limited preservation.

The sensitive natural and cultural resources that exist within the study area present considerable complications for determining the best future management option. Alternatives with greater levels of historic preservation have greater adverse impacts on natural resources, and alternatives that provide greater protection of natural resources have greater adverse impacts on cultural resources. Alternative C was identified as the preferred alternative because it provides the greatest balance in preserving important natural and cultural resources and would provide additional visitor opportunities.

This *Final Environmental Impact Statement and General Management Plan Amendment* has been distributed to other agencies and interested organizations and individuals for their review. Following a 30 day no-action period, a “Record of Decision” on the final approved and amended management plan will be issued by the NPS regional director. For further information on this document, contact the Superintendent, Great Smoky Mountains National Park, 107 Park Headquarters Road, Gatlinburg, Tennessee 37738.

SUMMARY

INTRODUCTION

The Elkmont Historic District is located within the Tennessee portion of Great Smoky Mountains National Park (Park), approximately 6 miles from Park Headquarters and 8 miles from Gatlinburg, Tennessee.

For more than 10,000 years, various American Indian groups occupied the general area of Elkmont. Cherokees were present in the area at the time of contact with European-Americans.

The first recorded European-American settlement in the Elkmont area occurred in the 1830s along Jakes Creek, a tributary of the Little River, and consisted primarily of a subsistence-based agricultural economy. By the 1880s, small-scale logging operations were underway in the vicinity. However, because the area was so remote and timbering operations were relatively primitive, commercial opportunities were limited.

Large-scale, industrial logging began in the area in the early 1900s when the Little River Lumber Company was established in Townsend, Tennessee. By 1908, The Little River Railroad Company had constructed a rail line along the Little River from Townsend to the current site of Elkmont. The community of Elkmont developed between 1908 and 1925 in the typical “boom” fashion of many communities associated with resource extractive activities during that era.

Two private resort communities were established on the outskirts of Elkmont in 1910 (the Appalachian Club) and 1912 (the Wonderland Club). Between 1910 and 1940, a social clubhouse, a hotel and annex, and several dozen individual vacation cabins were constructed as part of these two, separate social clubs.

In 1926, Congress passed legislation for the creation of a national park in the Smoky Mountains, and the Park was officially established in 1934. Unlike many western parks that were largely created from existing federal lands, Great Smoky Mountains National Park was created from lands purchased by the States of North Carolina and Tennessee from individual land owners and deeded as grant to the federal government for purposes of establishing this Park.

Rather than facing condemnation through the state-held power of eminent domain, most property owners in the two clubs chose an option offered in 1932 that permitted a partial payment for property in exchange for a lifetime lease. Between 1934 and 1942, the formal community of Elkmont was removed. By the late 1960s, the National Park Service (NPS) had developed the present day campground on the site.

In 1952, lifetime leases held by members of the two clubs were surrendered for a fixed, 20-year lease in exchange for commercial power service. In 1972, the Secretary of the Interior permitted Elkmont leases to be extended for another 20 years. In the early 1990s, attempts at extending leases were unsuccessful and in 1992, all but three leases on buildings expired. The final three leases expired in 1996 and 2001. The vacated buildings have remained empty since leases expired pending a final decision on the future management of Elkmont.

PURPOSE AND NEED FOR ACTION

The purpose of this environmental planning initiative is to reevaluate, and amend if appropriate, the current management strategy for the Elkmont Historic District that was included in the *General Management Plan, Great Smoky Mountains National Park, North Carolina-Tennessee* (NPS 1982b). Based on direction in that plan, the National Park Service intended to remove all buildings under lease to the Elkmont Preservation Committee when leases expired, and return the area to a natural state. The only other action proposed in the 1982 plan was the construction of a picnic shelter. The 1982 plan states:

Leases for approximately 50 structures occupied by the Elkmont Preservation Committee (cabins and the Wonderland Hotel) will expire in 1992, and four remaining leases will expire in 2001. None of these leases will be extended and the structures are proposed for removal on termination of the leases. Building sites will be returned to a natural state.

In 1994, the Elkmont community was listed in the National Register of Historic Places as a historic district, with 49 of the 74 buildings that remain listed as contributing to the character of the district. As a result of that designation, any subsequent action affecting the district requires consultation with the Tennessee State Historic Preservation Officer.

Between 1994 and 1999, the National Park Service proposed three separate plans for Elkmont, and the State Historic Preservation Officer objected to each. The Advisory Council on Historic Preservation was consulted regarding the last plan, and responded that the proposal constituted a new action when compared with the direction provided in the 1982 *General Management Plan*.

New consultation and a new planning process were started in 2001. The process incorporated requirements of the National Historic Preservation Act and National Environmental Policy Act. Its intent was to determine and develop the appropriate action for future management of the Elkmont Historic District.

OBJECTIVE AND SCOPE OF ANALYSIS

The scope of this *General Management Plan* amendment is to

- develop a full range of management alternatives for the Elkmont Historic District under the National Environmental Policy Act
- compare potential impacts that would result from implementation of each of the alternatives
- select a preferred alternative that considers both agency and public comment

The alternative development process was based on a series of goal statements for the Elkmont Historic District. The primary goal identified is to “foster enjoyment, understanding, appreciation, and protection of natural and cultural resources both within Elkmont Historic District and Parkwide” by

- creating opportunities for emotional and intellectual connections to these resources
- protecting and perpetuating the significant and diverse natural resources and ecosystems (including forest communities and water resources) found within the Elkmont Historic District, keeping them free from impairment
- protecting and perpetuating the tangible aspects, such as archeological sites, historic buildings and structures, and landscapes, and intangible aspects, such as feelings of attachment and family life, myth, folklore, and ideology, of the cultural resources that comprise the Elkmont Historic District

As stated in the *General Management Plan* (NPS 1982b), the overall management objective is to “manage the Park in a manner consistent with the purpose of preservation, enjoyment and benefits to humankind through scientific study of its distinctive combination of natural and cultural resources.” The *General Management Plan* also includes management objectives prepared by the Park superintendent for each of the Park’s resources.

The process of developing amended management plan alternatives included refining management goals and objectives specific to resources at Elkmont Historic District to reflect current management direction.

- Management objectives state that any historic resources selected for preservation should serve an agency need and should be adequately maintained.
- Buildings and associated landscape features would be retained in clusters and associations that are sufficient to provide a sense of character of the district.
- Management actions must be consistent with legislative and executive mandates as well as NPS policies in order to protect and perpetuate the significant and diverse natural resources and ecosystems found within the district and, where possible, restore the natural processes.

Consistent with NPS policy, the National Park Service obtained input from the public during the development both of project goals and objectives, and more specific cultural resource goals and management objectives.

Guiding principles for visitor use and experience are to promote visitor activities at appropriate locations, levels, and times that minimize adverse impacts on Park resources, while achieving educational goals and ensuring that visitor access to adjacent use areas is adequately maintained.

ALTERNATIVES

Concurrent with development of project goals and objectives, potential uses for the Elkmont Historic District were considered. Park needs were examined to determine if the Park's proposed uses were compatible with the project goals and objectives, and with the constraints and opportunities presented by the natural and cultural resources of the Elkmont Historic District and its location within the Park. The resulting potential uses for the District, as defined by the National Park Service, were then considered along with uses identified by the public and the consulting parties. Consulting parties are defined in subsection 800.8(c)(2) of the National Historic Preservation Act.

The NPS planning team, with input from Park staff, members of the public, and consulting parties, identified issues in regard to future management of the Elkmont Historic District. The primary concerns that were identified related to cultural resources, natural resources, and visitor experience. The plan chosen for the Elkmont Historic District will provide guidelines for addressing specific issues, while adhering to the Park’s mission, the vision for the Elkmont Historic District, and all laws and regulations that apply to Park planning procedures.

The project alternatives presented in this Final Environmental Impact Statement were developed based on identified uses, and incorporate varying arrangements and degrees of use to meet resource needs. They are intended to represent a full range of possible actions to address the purpose and need for the project. The primary issues identified during scoping centered on restoration of natural plant communities and uses of the historic buildings, including curatorial storage and use as public lodging facilities. Because the condition of the Wonderland Hotel was not completely understood until the project alternatives were developed, alternatives were adjusted prior to public scoping and

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impact analysis to reflect two options, including complete removal of the building or reconstruction. Reconstruction requires approval by the Director of the National Park Service.

Seven alternatives were developed to provide a full range of management options for the Elkmont Historic District. These alternatives, which are described below, include

- the No Action Alternative, as required by the National Environmental Policy Act
- Alternative A, which follows the *General Management Plan* (NPS 1982b) but also includes active restoration of natural resources
- Five alternatives, designated Alternative B through Alternative F, that propose incrementally greater preservation and reuse of district buildings for a variety of purposes

No Action Alternative

The No Action Alternative is tiered to and follows management direction described in the *General Management Plan* (NPS 1982b). The *General Management Plan* calls for removal of all buildings at Elkmont upon expiration of leases. While technically an “action,” this direction maintains the current management plan for disposition of buildings at Elkmont and is considered no action based on current management policies. A physical “no action” that would permit buildings to simply decay in place is not legal and was dismissed from consideration for two reasons:

- Because Elkmont is listed as a historic district in the National Register of Historic Places, the National Park Service is required to maintain the property until a management decision is made.
- The National Park Service is required to maintain safe conditions in developed areas of the Park. Allowing structures to decay would create an unsafe environment for the visiting public.

As described in the *General Management Plan* (NPS 1982b), under the No Action Alternative all buildings and structures would be removed and the area would be allowed to return to a natural state. This alternative is consistent with NPS practice from the earliest days of Park establishment where buildings were removed. Under this alternative, rock walls, chimneys and other cultural landscape features would remain unless retention of these features would present a safety hazard.

No change in management direction from that outlined in the *General Management Plan* (NPS 1982b) for the Elkmont Historic District would occur following removal of buildings and structures. Visitor use, recreational opportunities, and natural resource management would remain the same.

Alternative A

Alternative A proposes the greatest protection of natural resources and natural systems within the study area and calls for the removal of all buildings, as outlined in the *General Management Plan* (NPS 1982b). However, Alternative A would improve on the No Action Alternative by proposing active restoration of native plant species in all areas disturbed by previous human activity and occupation, including areas from which buildings were removed. Active restoration would include removal of non-native species, seeding and planting with native species collected and/or propagated from the District or nearby locations, and ongoing vegetation management to ensure appropriate conditions for plant reestablishment.

Of particular interest in restoration efforts is the montane alluvial forest. This climax plant community type occurs in the Elkmont area primarily within the floodplains of the Little River and its tributary, Bearwallow Creek. This plant community type was heavily impacted on this site by agricultural uses, subsequent logging operations, and use of the area as a resort. The montane alluvial

forest is in the early stages of succession at Elkmont, but natural processes for understory plant regeneration are limited by past human activities.

Alternative A would create conditions conducive to the establishment of native plant communities in disturbed areas throughout the District. Active restoration of native plant communities would increase species diversity, improve and increase wildlife habitat, and provide soil stabilization. Unlike the No Action Alternative, features such as rock walls and chimneys would be removed unless removal would cause undue ground disturbance.

Alternative B

Alternative B would retain an example collection of historic buildings in one area. These would include the Appalachian Clubhouse and 12 cabins, 11 of which are considered contributing elements to the character of the Elkmont Historic District. In all areas where buildings were removed, native plant communities and natural systems would be actively restored. Chimneys and other cultural landscape features would remain unless they presented safety hazards.

The buildings proposed for retention would provide a contiguous collection of representative buildings restored on the exterior. The associated cultural landscape would be retained to represent a selected time from the period of significance. Interpretive features, such as wayside exhibits, would describe features within the Elkmont Historic District.

The interior of the Appalachian Clubhouse would be rehabilitated for day use under special use permits. The restored and preserved cabins would function as a museum community.

A new parking area that would include 106 parking spaces would be created. The parking area would accommodate day users within the District and hikers using the trails that originate in the Elkmont area.

Sensitive plant community types, such as the montane alluvial forest, would be actively restored. Developed visitor uses would occur in areas away from this forest type, which would allow plants to regenerate without the impacts of visitation.

Alternative C

Alternative C is both the environmentally preferred alternative and the NPS' preferred alternative. This alternative provides the most effective balance between natural and cultural resources while permitting traditional uses and additional new uses to occur.

This alternative would retain the Appalachian Clubhouse and 16 historic buildings, 15 of which are listed as contributing elements to the character of the Elkmont Historic District in the area known as Daisy Town, adjacent to the clubhouse. This area was the first part of the resort community that was developed. One cabin in the area known as Society Hill would be retained for its associative value with David C. Chapman, an important figure in the Park movement during the 1920s and 1930s. The Spence cabin in Millionaire's Row would be rehabilitated for visitor day use.

In all other areas, the buildings would be removed. In these areas, native plant communities and natural systems would be restored. Chimneys and other cultural landscape features would remain unless they presented a safety hazard.

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The interior of the Appalachian Clubhouse would be rehabilitated for day use under special use permits. The restored and preserved cabins would function as a museum community.

A new parking area that would include 106 parking spaces would be created. The parking area would accommodate day users within the District and hikers using the trails that originate in the Elkmont area.

Sensitive plant community types, such as the montane alluvial forest, would be actively restored. Developed visitor uses would occur in areas away from this forest type, which would allow plants to regenerate without the impacts of visitation and associated impacts.

Alternative D

Alternative D would preserve buildings in both the Appalachian Club and Wonderland Club areas.

Two options exist for the Wonderland Hotel and Annex: complete removal of both structures (D1), or reconstruction of the Wonderland Hotel and rehabilitation of the annex for use as a curatorial facility for the Park's archived cultural resources (D2). Six contributing cabins at the Wonderland Club would be retained for use as temporary housing for visiting scientists involved in Park research.

This alternative would retain the Appalachian Clubhouse and 16 historic buildings, 15 of which are listed as contributing elements to the character of the Elkmont Historic District in the area known as Daisy Town. In addition, one cabin with contributing status in the area known as Society Hill would be retained for the associative value with David C. Chapman. Another contributing cabin in the area known as Millionaire's Row along the Little River would be retained for the associative value with Colonel Wilson B. Townsend, President of the Little River Lumber Company.

In all areas where buildings were removed, native plant communities and natural systems would be actively restored. In these areas, chimneys and other cultural landscape features would remain unless they presented a safety hazard.

The interior of the Appalachian Clubhouse would be rehabilitated for day use under special use permits. The restored and preserved cabins would function as a museum community.

A new parking area would be constructed to accommodate day users within the District and hikers using the trails that originate in the Elkmont area. Between 119 and 169 new parking spaces would be created.

Alternative E

Alternative E proposes two options for the Wonderland Hotel and Annex: complete removal of both structures (E1), or reconstruction of the Wonderland Hotel and rehabilitation of the annex for overnight lodging to be managed by a private concession operation (E2). Seven cabins at the Wonderland Club, six of which are contributing elements to the District, also would be rehabilitated for overnight use under the concession operation. A dining facility run by the concessioner would be developed at the reconstructed hotel, but would be limited to overnight guests. As part of the concession operation, in-depth educational programs for overnight guests would be provided.

Along the Little River in the area known as Millionaire's Row, all six contributing cabins, including the cabin associated with Colonel Wilson B. Townsend, President of the Little River Lumber

Company, would be rehabilitated. They would be used as temporary housing for visiting scientists involved in Park research.

Alternative E would retain the Appalachian Clubhouse and 16 historic buildings in the area known as Daisy Town. Fifteen of these buildings are listed as contributing elements to the character of the District. One cabin with contributing status in the area known as Society Hill would be retained for the associative value with David C. Chapman.

The interior of the Appalachian Clubhouse would be rehabilitated for day use under special use permits. The restored and preserved cabins would function as a museum community.

A new parking area would be constructed to accommodate day users within the District and hikers using the trails that originate in the Elkmont area. Between 119 and 244 new parking spaces would be created.

The existing sewage treatment plant that currently serves the campground would not be adequate under the option to reconstruct the Wonderland Hotel and provide a dining facility. Therefore, an alternative means of sewage treatment would be required.

Natural resources would be restored in areas where buildings were removed in Society Hill. Chimneys and other cultural landscape features would remain unless they presented a safety hazard.

Alternative F

Alternative F would result in the greatest retention and preservation of historic buildings in the District and the least restoration of natural resources.

Alternative F proposes two options for the Wonderland Hotel and Annex: complete removal of both structures (F1), or reconstruction of the Wonderland Hotel and rehabilitation of the annex for overnight lodging to be managed by a private concession operation (F2). Eight cabins at the Wonderland Club, six of which are contributing elements to the District, also would be rehabilitated for overnight use under the concession operation. If the hotel was reconstructed, a dining facility that was open to all Park visitors would be developed at the hotel and run by the concessioner.

In the area known as Millionaire's Row, all six contributing cabins would be rehabilitated for use as overnight lodging as part of the concession operation. This would include the cabin associated with Colonel Wilson B. Townsend. In the Society Hill area, 22 cabins, 15 of which are considered contributing to the character of the District, would be rehabilitated for overnight use as part of a concession operation. One cabin with contributing status in the area known as Society Hill would be retained for the associative value with David C. Chapman.

Alternative F would retain the Appalachian Clubhouse and 16 historic buildings in the area known as Daisy Town. Fifteen of these buildings are listed as contributing elements to the character of the District. The interior of the Appalachian Clubhouse would be rehabilitated for day use under special use permits. The restored and preserved cabins would function as a museum community.

A new parking area would be constructed to accommodate day users within the District and hikers using the trails that originate in the Elkmont area. Between 214 and 299 new parking spaces would be created.

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The existing sewage treatment plant that currently serves the campground would not be adequate under the option to reconstruct the Wonderland Hotel, provide a dining facility, and provide overnight use of the cabins by visitors. Therefore, an alternative means of sewage treatment would be required.

Because most of the buildings would be retained, Alternative F would include little to no opportunity for restoration of natural resources and natural processes.

IMPACT TOPICS AND PLANNING CONSIDERATIONS

NPS general management plans are accompanied by environmental impact statements that disclose the anticipated impacts of the alternatives on resources and on park visitors and neighbors. The impact topics and subtopics addressed in the environmental impact statement for this *General Management Plan* amendment include the following:

- Impacts on cultural resources, including buildings, cultural landscapes, and archeological resources
- Impacts on natural resources, including soils; biotic communities; threatened, endangered, rare, and sensitive species; wetlands; water quality; floodplains; and air quality
- Impacts on interpretation and visitor use, including visitor experience and visitor facilities
- Impacts on the socioeconomic environment, including land use, and access and circulation
- Impacts on other resources, including the viewshed and soundscape
- Impacts on NPS operations

Certain aspects of these topics require special consideration. Specifically:

- The study area is listed as a historic district in the National Register of Historic Places, and this designation affords the buildings special status. The National Park Service is tasked with protecting these resources. Any action affecting listed buildings requires consultation with the Tennessee State Historic Preservation Officer and the Advisory Council on Historic Preservation.
- The Little River flows through the center of the Elkmont Historic District and is designated an Outstanding National Resource Water with Tier III status. This designation strictly prohibits permitting new point source discharges or expanding existing point source discharges, and can greatly limit adjacent land use and development that may create additional non-point source pollutants.
- A plant community type known as montane alluvial forest occurs in several areas within the study area. This community type is listed as globally imperiled with only 6 to 20 known sites in the world.

ENVIRONMENTAL CONSEQUENCES

No Action Alternative

The greatest adverse impacts under this alternative would be to the National Register-listed Elkmont Historic District. While many components of the cultural landscape would remain, the historic buildings provide the greatest definition to the cultural landscape and their removal would significantly alter the historic landscape for which the District is listed. The result of implementing this alternative would be an irretrievable commitment of cultural resources through the permanent removal of historic buildings.

Other important findings include the following:

- The long-term productivity of all biotic resources would benefit from the increase in land available for restoration of sensitive native plant communities, particularly the globally imperiled montane alluvial forest.
- Water resources related to the Little River, a designated Outstanding National Resource Water, would be protected under this alternative.
- Requirements for Park operations and maintenance would be considerably reduced.

Alternative A

Similar to the No Action Alternative, the greatest adverse impacts under this alternative would be to the National Register-listed Elkmont Historic District. While many components of the cultural landscape would remain, the historic buildings provide the greatest definition to the cultural landscape and their removal would significantly alter the historic landscape for which the District is listed. The result of implementing this alternative would be an irretrievable commitment of cultural resources through the permanent removal of historic buildings.

As a result of active restoration of natural resources, these resources would be improved to the greatest extent possible under this alternative. The long-term productivity of all biotic resources would benefit from the increase in land available for restoration of sensitive native plant communities, particularly the globally imperiled montane alluvial forest, and from implementation of a comprehensive management approach for non-native, invasive plants.

Other important findings include the following:

- Water resources related to the Little River, a designated Outstanding National Resource Water, would be protected under this alternative.
- Visitor use activities would not increase above existing levels.
- Overall impacts to Park operations and maintenance would be beneficial.
- Pedestrian circulation would utilize existing roadways, aiding in minimization of impacts to natural systems.

Alternative B

The greatest impacts under this alternative would be to the National Register-listed Historic District. While many components of the cultural landscape would remain, including the Appalachian Clubhouse and 11 contributing buildings, the majority of contributing buildings in the District would be removed. The buildings retained would provide a representative example of the resort

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community and architecture in one area of the District. Historic buildings provide the greatest definition to the cultural landscape, and removal of many of these elements would significantly alter the historic landscape for which the District is listed.

Where buildings were removed, natural resources would be actively restored. The long-term productivity of all biotic resources would benefit in the most sensitive areas because of the increase in land available for restoration of sensitive native plant communities, particularly the globally imperiled montane alluvial forest.

Other important findings include the following:

- Additional sewage loading to the existing campground wastewater system would occur from the day use facility at the Appalachian Clubhouse, but the small increase would not exceed permitted discharge levels.
- A negligible increase in non-point source pollutant loadings to water resources would occur as a result of a small increase in surface water runoff.
- There would be a minor increase in visitation associated with new uses.
- Increases in the need for Park operations and maintenance would result from new uses associated with the Appalachian Clubhouse and museum community in Daisy Town.

Alternative C

This alternative would result in the most effective balance between preserving natural and cultural resources. Some of the most important resources would be preserved in this alternative, including the original portion of the resort community, the Chapman and Spence cabins, and the dominant area of montane alluvial forest currently occupied by buildings. However, while many components of the cultural landscape would remain, including the Appalachian Clubhouse and 17 other contributing buildings, nearly two-thirds of the contributing buildings in the District would be removed. The buildings retained would preserve the original core of the resort community.

Where buildings were removed, natural resources would be actively restored. The long-term productivity of all biotic resources would be benefited in the most sensitive areas because of the increase in land available for restoration of native plant communities, particularly the globally imperiled montane alluvial forest.

Other important findings include the following:

- Sewage generated by the day use facility at the Appalachian Clubhouse would increasingly load the existing campground wastewater system, but this increase would be small and within currently permitted discharge levels.
- A negligible increase in non-point source pollutant loadings to water resources would occur as a result of increased use.
- There would be a minor increase in visitation associated with new uses.
- NPS operations would benefit from revenue generated by rental of the Appalachian Clubhouse as a public, day use facility, and from the reduction in deferred maintenance that would occur with the removal of buildings.

Alternative D

This alternative would preserve cultural resources in all areas of the District, which would result in long-term beneficial effects. A majority of the contributing elements in the District would remain, including the Appalachian Clubhouse and 15 adjacent contributing buildings, cabins associated with David C. Chapman and Colonel Wilson Townsend, as well as all contributing cabins in the Wonderland Club. Under one option, the Wonderland Hotel would be reconstructed and annex retained and each rehabilitated to provide a curatorial storage facility, but reconstruction of the hotel would require approval by the Director of the National Park Service. Five contributing cabins in Millionaire's Row and 16 contributing cabins in Society Hill would be removed, which would result in adverse effects.

A portion of montane alluvial forest area that currently is occupied by buildings would continue to be adversely impacted by retention of the cabin associated with Colonel Wilson B. Townsend, but the remaining area would be restored. Where buildings were removed, natural resources would be actively restored. The long-term productivity of all biotic resources would be benefited in the most sensitive areas because of the increase in land available for restoration of native plant communities, particularly the globally imperiled montane alluvial forest.

Other important findings include the following:

- A minor increase in wastewater loading would occur to the existing campground wastewater system from the day use facility at the Appalachian Clubhouse, overnight use at Wonderland cabins, and use of the curatorial facility (if the hotel was constructed). This increase would require construction of a flow equalization basin at the sewage treatment plant, but the increase in wastewater would not exceed currently permitted discharge levels.
- A negligible increase in discharge of non-point source pollutant loadings to water resources would be added as a result increased use.
- There would be a minor increase in visitation associated with new uses.
- Increases in demand for Park operations and maintenance would result from the uses associated with retained buildings.

Alternative E

This alternative would preserve cultural resources in all areas of the District, which would result in long-term beneficial effects. A majority of the contributing elements of the District would remain, including the Appalachian Clubhouse and 15 adjacent contributing buildings, six contributing cabins in Millionaire's Row including the cabin associated with Colonel Wilson B. Townsend, the cabin associated with David C. Chapman, and all contributing cabins in the Wonderland Club. The Wonderland Hotel Annex would be removed under Alternative E1. Under Alternative E2, the hotel would be reconstructed and annex retained for overnight lodging, but reconstruction would require approval by the Director of the NPS. Sixteen contributing cabins in Society Hill would be removed, which would cause adverse effects.

The portion of montane alluvial forest currently occupied by buildings in Millionaire's Row would continue to be adversely impacted by the retention of these cabins for use as temporary housing for visiting scientists. The occupation of buildings and associated maintenance in the montane alluvial forest would impact this sensitive plant community considerably. In Society Hill, where buildings were removed, natural resources would be actively restored, which would result in a beneficial impact on biotic communities.

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Other important findings include the following:

- A moderate increase in wastewater loading would occur to the existing campground wastewater system under E1, but this increase would be permissible under existing permits, provided that the existing treatment plant was upgraded. Alternative E2 would create a major increase in wastewater requiring an alternate means of treatment outside the existing wastewater treatment facility.
- A minor increase in non-point source pollutant loadings to water resources would result from increased visitation and use.
- Three buildings proposed for retention in Millionaire's Row lie within the 100-year floodplain, immediately adjacent to identified wetlands.
- There would be a moderate increase in visitation associated with new uses.
- Park operations and maintenance would be adversely impacted by the uses associated with retained buildings in addition to the need for management of the private concession operation.

Alternative F

This alternative would preserve cultural resources in all areas of the District, which would result in long-term beneficial effects. Most contributing elements in the District would remain in this alternative, as well as many non-contributing buildings for use by overnight visitors. The Wonderland Hotel Annex would be removed under Alternative F1, which would cause adverse effects. Under Alternative F2, the hotel would be reconstructed and annex retained for overnight lodging, but reconstruction would require approval by the Director of the NPS.

Other important findings include the following:

- No portion of montane alluvial forest within the District would be restored. Occupation of buildings and associated maintenance in the montane alluvial forest would adversely impact this sensitive plant community.
- A major increase in wastewater loading would occur to the existing campground wastewater system under F1 and F2. All additional wastewater generated above permitted levels would require alternate treatment.
- A minor increase in non-point source pollutant loadings to water resources would occur as a result increased use.
- Three buildings proposed for retention in Millionaire's Row are located in the 100-year floodplain, immediately adjacent to identified wetlands.
- There would be a major increase in visitation associated with new uses and the intensity of visitation would likely create moderate to major impacts on natural and cultural resources in addition to impacting visitor experience.
- Adverse impacts to Park operations and maintenance would be created by the uses associated with retained buildings and the need to manage the private concession operation.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

With regard to Section 101 of the National Environmental Policy Act, when considering all factors described in this analysis collectively, and seeking a management plan “in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony,” Alternative C was identified as the environmentally preferred alternative. Alternative C “best protects, preserves and enhances cultural, historic and natural resources” in the Elkmont Historic District by causing “the least damage to the biological and physical environment.”

Alternative C would actively restore native plant communities in all locations where buildings would be removed and in areas previously impacted by human activity, providing for the long-term productivity of biotic resources. In particular, this alternative would provide a long-term benefit to the globally imperiled montane alluvial forest by allowing this resource to become reestablished in areas and by directing human activity to areas that will not directly conflict with this resource.

This alternative would retain, restore, and preserve buildings and cultural landscape features listed in the National Register of Historic Places in the Appalachian Club portion of the District. The portion of the District in which cultural resources would be restored is at a size that would ensure an appropriate level of ongoing preservation without further burdening park operations. At the same time, Alternative C would achieve a wide range of visitor uses and opportunities for visitor understanding of natural and cultural resources. The retained cultural components and other resources within the District would be expected to accommodate visitation levels without experiencing major adverse impacts.

A minor increase in visitation above current levels would occur as a result of implementing this alternative. Impacts to the Little River, listed as an Outstanding National Resource Water, would be negligible from both point and non-point pollution sources.

Long-term, moderate benefits to Park operations would be achieved because the current level of effort to maintain buildings in a stabilized state of repair would be greatly reduced, as would the level of patrol required and the safety hazards to the visiting public. Most impacts would be short-term and, with the exception of permanent impacts to contributing buildings, all other impacts would be minor to negligible.

THE PREFERRED ALTERNATIVE OF THE NATIONAL PARK SERVICE

To identify the preferred alternative for managing the Elkmont Historic District, the National Park Service employed a decision-making process called “Choosing By Advantages.” This decision-making process analyzed the advantages of each alternative, and then quantified and ranked total advantages for each alternative. A cost/benefit analysis was applied and the preferred alternative was identified.

Each of the seven project alternatives was individually evaluated under four categories, defined as “factors” in the Choosing by Advantages process. The four factors assessed were

- protection of natural resources
- protection of cultural resources
- provision for visitor education and enjoyment
- protection of public health, safety, and welfare

SUMMARY

They were ranked for importance in that same order. Rank was based on Park purpose, legal requirements, policy, and guidelines. Benefits, defined as advantages in this process, were calculated for each alternative within each factor. Individual scores for each alternative derived from each separate factor were then tallied into a combined summary as a means of ranking alternatives with all factors considered for total advantages. Once overall ranking was established, a cost/benefit analysis was applied to ranked alternatives based on their total costs. The preferred alternative was selected based on a value ratio that calculated the alternative with the greatest benefits or advantages as compared to the cost.

Of the seven alternatives, Alternative C was identified as the NPS' preferred alternative. Prior to conducting a cost/benefit analysis, it appeared that Alternative D was the most advantageous. However, Alternative D would be considerably more expensive than Alternative C. This cost difference, in conjunction with all other factors in the analysis, illustrated that Alternative C provided the most benefit for the cost. Alternative C achieves a strong balance among all factors considered, particularly concerns in regard to potential impacts to cultural and natural resources.

A GUIDE TO THIS DOCUMENT

The document is organized in the following order:

Volume I

- Chapter 1 provides background on the Elkmont Historic District, the planning process, applicable laws and policies, goals and objectives, and impact topics.
- Chapter 2 provides a complete description of the project alternatives. The specifics of each alternative are presented in their entirety and summarized in tabular format. Summary tables at the end of the chapter are organized to allow comparisons among project alternatives.
- Chapter 3 contains information on the affected environment (existing condition) and describes resources that could be affected as a result of project implementation.
- Chapter 4 describes the environmental consequences associated with implementing each alternative.
- Chapter 5 provides a record of the public's involvement during the planning process and a summary of agency consultation

Volume II

- Chapter 6 provides a summary of public and agency comments and NPS responses on the draft General Management Plan Amendment and environmental impact statement.
- Appendices contain information on legislation guiding this planning process, a cultural landscape assessment of the Elkmont Historic District, estimated costs associated with each alternative, visual resource exhibits, description of site archeology research needs and action plans, consulting parties and 2003 condition assessment for buildings within the District.
- Bibliography, List of Preparers, Acronyms & Abbreviations, Glossary and Index

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- **Volume 2 contains:**
- 6.0: Public and Agency Comments

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Introduction

1



1.0 INTRODUCTION

1.1 PURPOSE AND NEED FOR THE PLAN

1.1.1 Purpose

The purpose of this environmental planning initiative is to reevaluate, and amend if appropriate, the current management strategy for the Elkmont Historic District (District) that was included in the *General Management Plan, Great Smoky Mountains National Park, North Carolina-Tennessee*, which was approved and published in 1982 (NPS 1982b).

1.1.2 Need for Action

The Elkmont Historic District (District) of Great Smoky Mountains National Park (Park) in Sevier County, Tennessee contains 74 structures. These include cabins, outbuildings, a clubhouse (Appalachian Clubhouse), a hotel (Wonderland Hotel), and other features, including bridges and water tanks. Until December 1992, the buildings were under the lease of the Elkmont Preservation Committee. Except for three buildings vacated in 1996 and 2001, all of the buildings in the District have been vacant since 1992.

Based on direction in the *General Management Plan, Great Smoky Mountains National Park, North Carolina-Tennessee* (NPS 1982b), the National Park Service planned to remove all of the buildings once their leases expired, allowing the area to return to a natural state. The *General Management Plan* classifies Elkmont as a developed area and the only other action proposed in addition to removal of the buildings was construction of a picnic shelter. The *General Management Plan* states:

Leases for approximately 50 structures occupied by the Elkmont Preservation Committee (cabins and the Wonderland Hotel) will expire in 1992, and four remaining leases will expire in 2001. None of these leases will be extended and the structures are proposed for removal on termination of the leases. Building sites will be returned to a natural state.

In 1994, the Elkmont community was listed in the National Register of Historic Places as a historic district, with 49 of the 74 structures listed as contributing to the character of the District. (The National Register of Historic Places, which is referred to repeatedly throughout this document, can be accessed on the Internet at <http://www.cr.nps.gov/nr/>.) As a result of that designation, any action affecting the District requires consultation with the Tennessee State Historic Preservation Officer.

The National Park Service proposed three plans for management of the Elkmont Historic District between 1994 and 1999. The original plan provided in the *General Management Plan*, which called for removal of all of the contributing structures, was objected to by the State Historic Preservation Officer. The National Park Service proposed two additional management plans to the State Historic Preservation Officer and Advisory Council on Historic Preservation. Both agencies objected to the second plan, and the agencies felt that the third plan constituted a new action that would require initiation of a new consultation process.

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Consequently, in 2001, the National Park Service initiated an environmental planning process to reevaluate the strategy provided in the *General Management Plan* and develop a new plan for managing the Elkmont Historic District that takes its listing in the National Register of Historic Places into consideration. This process is designed to be comprehensive, incorporating public input; National Historic Preservation Act regulations; environmental laws; and other laws, policies, and guidelines dealing with cultural and natural resources. The purpose of this environmental planning process was to develop and assess alternatives, and to determine the future management direction for the Elkmont Historic District.

1.2 BACKGROUND

The purposes of the National Environmental Policy Act are “To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality” (42 *United States Code*, Section 4321).

Under the National Environmental Policy Act, the current planning process was begun as an environmental assessment and a possible amendment to the *General Management Plan*. Because of the complex nature of the issues surrounding the Elkmont Historic District and level of controversy associated with potential project alternatives, the National Park Service subsequently elevated the process to an environmental impact statement.

The environmental impact statement process began in 2003 and has allowed for additional public involvement and more in-depth analysis of the issues. This document has been prepared to conform with the requirements of the National Environmental Policy Act and in conformance with the Council on Environmental Quality (1978) regulations. Because cultural resource issues are related to the core purpose of the project, requirements of the National Historic Preservation Act have been fully considered and integrated into this planning process.

Prior to initiating the formal National Environmental Policy Act process, the National Park Service formed a consulting parties group, as required by the National Historic Preservation Act and “Protection of Historic Properties” (36 *Code of Federal Regulations*, Part 800.2 (c)). This group included a diverse group of stakeholders and agencies that provide input on the issues concerning the eventual management of the Elkmont Historic District.

In addition to formal National Environmental Policy Act and National Historic Preservation Act requirements, the National Park Service established an extensive public involvement process to gather public input regarding issues that should be considered as part of the planning process. The intent of the comprehensive public participation was to ensure that the National Park Service, as the steward of our national heritage, cultural traditions, and community surroundings, fully understood and considered the public’s interest.

As part of the evaluation process for the Elkmont Historic District, several natural and cultural resource investigations were conducted. Using this information, the National Park Service identified a full range of reasonable management actions and analyzed them in concert with the

Park's mission and with consideration of stakeholder interests, as identified during the public involvement process.

Work to assess the condition of the contributing structures at Elkmont has been on-going since the late 1980s and continued during the planning process. Because of the deteriorated condition of many of the buildings, emergency stabilization measures were taken by the National Park Service.

Because the condition of the buildings is changing over time, a number of assessments of their structural stability have been undertaken. At the request of Park staff, the NPS' Historic Preservation Training Center completed historic structures assessment reports for the Appalachian Clubhouse in 1998 (McGrath 1998) and the Wonderland Hotel in 2001 (*Historic Preservation Training Center 2001*). The 2001 assessment for the hotel included only an exterior existing condition assessment and stabilization plan, and did not investigate interior conditions or include an engineering analysis. The assessment team stated that, by employing stabilization methods outlined in the report, the hotel could possibly still be stabilized, but that this must occur within two years. The National Park Service employed many of the stabilization techniques prescribed in the report, but as preservation crew members were repairing the roof, they discovered that there was more extensive structural damage and failure than was previously detected. In the winter of 2002, it became apparent that another assessment of the hotel would be necessary.

In April 2003, another assessment of the Wonderland Hotel was completed by the Historic Preservation Training Center (McGrath 2003). The assessment indicated that surface materials (carpeting, drywall, and dropped ceilings) covering the structure had prevented a complete investigation from being performed in 2001. The report further concluded that the interior structure in many areas had most likely already failed when the 2001 report was completed and that the overall structural stability of the Wonderland Hotel in 2003 was "serious" and should be classified as "failed." In August 2005, the majority of the hotel building collapsed because of the failed structural system.

1.2.1 Overview

The Department of the Interior, under which the National Park Service functions, is the nation's primary conservation agency and acts as a steward for most of our nationally owned public lands and natural resources. The Department of the Interior holds the responsibility for assessing resources and strives to ensure that their use and/or development are in the best interest of all citizens by encouraging stewardship and public participation in their care.

To achieve the objectives of the NPS mission, each national park is required to develop a general management plan to provide guidance in making decisions concerning management of its resources. The plans are designed to be used for 15 to 20 years. Much of the 1982 *General Management Plan* for Great Smoky Mountains National Park is still useful. However, because of the listing of the Elkmont Historic District in the National Register of Historic Places in 1994, issues concerning the District could not be addressed properly without additional investigations.

As its primary purpose, this *General Management Plan* amendment proposes and assesses a full range of alternatives that recognize the District's listing, so that a management plan for the District can be determined and implemented. Chapter 4 describes how resources would be

1.0 INTRODUCTION

impacted by each alternative. The goal of this environmental impact statement is to provide guidance to aid in determining the best balance between resource impacts and achieving the goals and objectives for the Elkmont Historic District.

1.2.2 Location and Brief Description

Great Smoky Mountains National Park is located in east Tennessee and southwestern North Carolina in the southern portion of the Appalachian Mountain range (Figure 1-1, page 5). The Park contains almost equal acreages in Tennessee and North Carolina, with the northern half in Blount, Sevier, and Cocke Counties, Tennessee and the southern half in Swain and Haywood Counties, North Carolina (NPS 1982b).

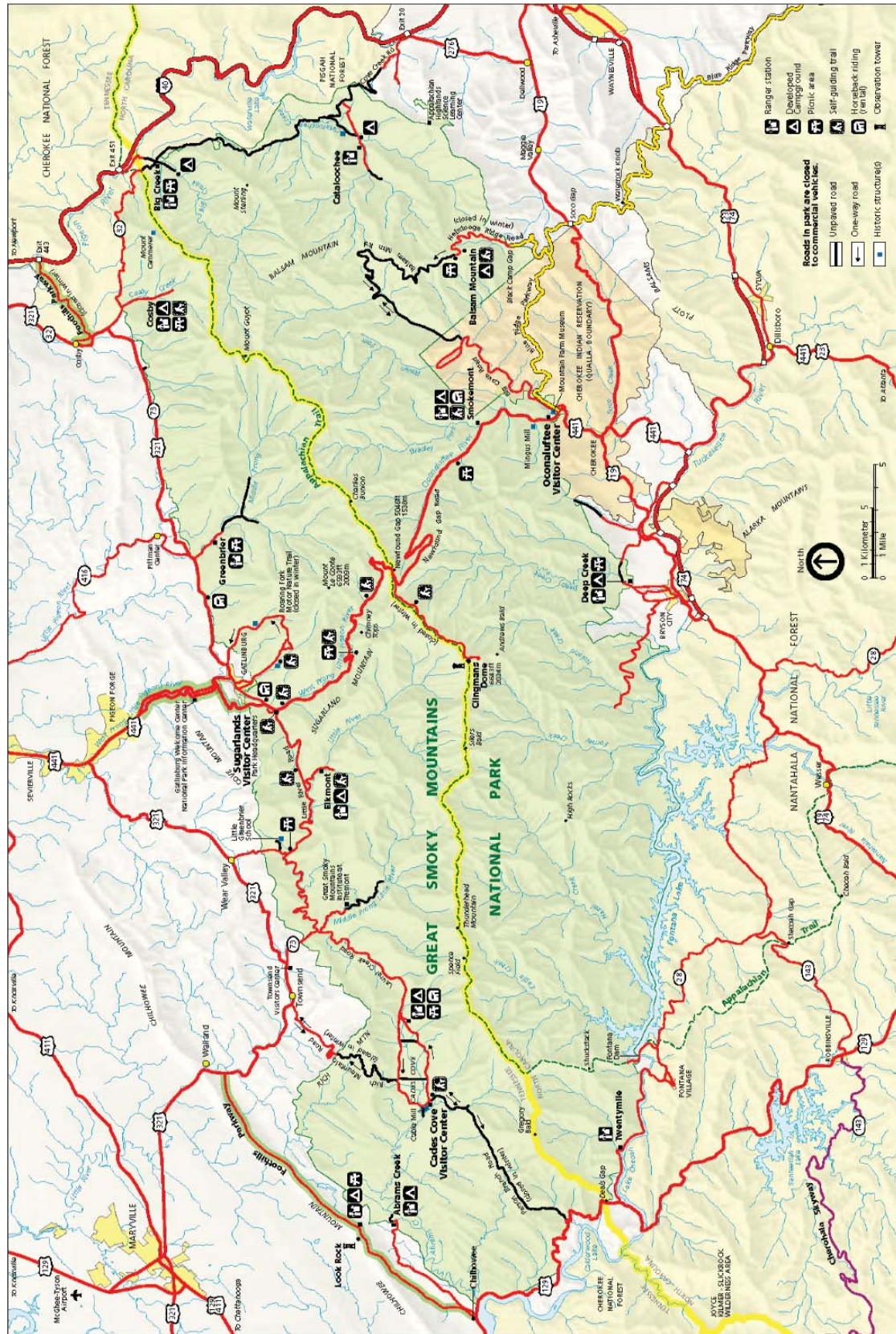
The Park area has been occupied by humans for at least the past 10,000 years (Bass 1975; Webb 2002). Although it is difficult, if not impossible, to assign tribal associations to the earlier prehistoric American Indian occupants, by at least the 15th to 16th century, the area was occupied by Iroquois-speaking Cherokee populations. No major Cherokee towns are known to have been located within the Park; however, sizeable settlements were present along many of the surrounding drainages. The Cherokee towns along the Little Tennessee and adjacent rivers in what is now east Tennessee were known as the Overhill Towns, while the Out Towns were situated in the Tuskegee drainage on the North Carolina side of the Park (Smith 1979; Greene 1996; Schroedl 2000;).

The first European explorers entered the area in the mid-1500s, but probably crossed the Appalachians to the north of the Park (Hudson 1990, 1997). Sustained European contacts with the Cherokees did not begin until after the settlement of Charleston, South Carolina in 1670. By the mid-1700s, the increasing European settlement pressure and accompanying spread of introduced diseases had caused major disruptions to the Cherokee populations. A series of land cessions throughout the late 1700s and early 1800s culminated in the 1835 Treaty of New Echota and resulted in the loss of most Cherokee lands in the east, although a number of Cherokees remained in the area. The Cherokees who continued to live in the area formed the nucleus of what is now The Eastern Band of Cherokee Indians (Royce 1884; Finger 1984).

The earliest European settlement of the immediate Park vicinity occurred during the late 1700s (Lambert 1958a; Pace 2001; Webb 2004), although the more mountainous interior of the region was settled later. However, some areas were not occupied until well into the 19th century. The early European inhabitants were primarily small farmers, many of whom supplemented their incomes by raising and selling livestock and through small-scale mercantile establishments. The more fortunate settlers farmed the richer and more easily cultivated soils found on the floodplains and in the larger coves, and raised crops such as corn, wheat, rye, and oats. Cattle and hogs were also raised and for many years were given free rein. Much of the corn was ground into meal for human consumption, and the remainder was used as fodder for the cattle, hogs, and work animals.

Small-scale logging took place in many parts of the Smoky Mountains during the late 1800s, but sizeable operations did not occur until the advent of mechanized, railroad logging in the early 1900s. Several large logging companies operated in the region during the 1910s and 1920s, including the Little River Lumber Company in the Elkmont area. Many of these companies ceased operations in the area by the late 1920s, although a few, including the Little River Lumber Company, continued operations into the 1930s (Lambert 1958b and 1961; Weals 1993).

Figure 1-1: Great Smoky Mountains National Park



The idea for a national park in the southern Appalachians had originated in the late 1800s (Taylor 2001), but gained momentum in the early 1920s with the recognition by preservationists of the environmental degradation caused by large-scale logging and recognition by businessman and government officials of the economic potential of such a park (Pierce 2000; Taylor 2001). Congress passed the Swanson-McKellar Bill in 1925, which authorized investigation and determination of Park boundaries, and allowed state commissions to begin collecting donations to purchase land for a national park in the Smoky Mountains. In the spring of 1926, legislation was passed in Congress and signed by President Calvin Coolidge providing for the establishment of Great Smoky Mountains National Park, and the Tennessee and North Carolina Parks Commissions began acquiring land throughout the area. The National Park Service began administration of an initial 150,000 acres within the Park in 1930, and the Park was officially established in 1934 (Pierce 2000).

1.2.3 The Park

The landscape in Great Smoky Mountains National Park is mountainous, with the highest peak, Clingmans Dome, reaching 6,643 feet and the lowest elevation at 840 feet above sea level (American Park Network Media 2004). Its natural environment includes one of the most diverse arrays of plant and animal species in the country. It is one of only nine national park units designated as both an International Biosphere Reserve (1976) and a World Heritage Site (1983).

- Biosphere Reserves are areas of terrestrial and coastal ecosystems that are internationally recognized within the framework of United Nations Educational, Scientific and Cultural Organization's Man and Biosphere Program.
- Sites on the World Heritage list are cultural and/or natural properties recognized by the World Heritage Committee as being of outstanding universal value.

These dual designations recognize the abundance and diversity of the plant communities and complex geology protected within the Park.

There are two educational facilities in the Park. The Great Smoky Mountains Institute is located at Tremont on the Tennessee side of the Park. The Appalachian Highlands Science Learning Center is at Purchase Knob on the North Carolina side along the southeastern border of the Park.

Currently, the important All Taxa Biodiversity Inventory is being conducted at Great Smoky Mountains National Park. The purpose of this inventory, which began in 1997, is to identify all of the species within the Park. The inventory is expected to be used as a model for other reserves. As a result of this investigation, 3,358 new records of species occurrence had been documented as of the year 2004, and 543 species new to science had been discovered (DLA 2004).

The Park covers 521,495 acres, received more than 9 million recreation visits in 2003, and had an annual budget of \$16.6 million for the 2004 fiscal year (NPS 2005). Three visitor centers are located in the Park at Sugarlands, Cades Cove, and Oconaluftee. Information about the Park is provided through use of displays, videos, books, guides, a web site, and maps. In addition, rangers and volunteers are available to help visitors get the most from their time in the Park. There are seven ranger stations in the Park located at Abrams Creek, Cades Cove, Elkmont, Smokemont, Deep Creek, Big Creek, and Cataloochee.

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The main road through the Park, Newfound Gap Road (U.S. Highway 441), is a well-known scenic drive that provides views of wildflowers, flowering trees, changing fall leaf colors, mountains, and historic buildings. Other Park roads also allow drivers to observe the Park's natural and cultural resources and provide connections to trails and paths.

The Park contains the following six historic districts that either are in or are nominated for the National Register of Historic Places:

- Roaring Fork
- Cades Cove
- Bud Ogle Farm
- Oconaluftee Archeological District
- Elkmont
- Cataloochee (nominated)

In addition, there are numerous historic buildings, some of which are listed or nominated for listing in the National Register of Historic Places. These include:

- Mayna Treanor Avent Studio
- Hall Cabin
- Alex Cole Cabin
- Little Greenbrier School/Church
- King-Walker Place
- Messer Barn
- John Ownby Cabin
- Oconaluftee (Smokemont) Baptist Church
- Mingus Mill (nominated)
- Tyson McCarter Place
- Jim Hannah Cabin (nominated)
- Little Cataloochee Baptist Church (nominated)

1.2.4 Elkmont Historic District

The Elkmont Historic District, shown in Figure 1-2, is located in Great Smoky Mountains National Park along the Little River in Sevier County, Tennessee. It is approximately 6 miles from the Sugarlands Visitor Center, which is 2 miles from the city of Gatlinburg, one of the Park's gateway communities. A complete discussion of the site history, from the time of prehistoric occupation to present day conditions, is provided in Section 3.1.

The Appalachian National Scenic Trail traverses the Park for approximately 70 miles, primarily along the ridge that constitutes the border between Tennessee and North Carolina. Horseback riding, bicycling, and backcountry hiking are some of the activities enjoyed by Park visitors (NPS 2003a). More than 800 miles of trails are available to visitors for horseback riding or walking. The park includes 1,108 campsites, 1,008 of which are developed. The Park also includes approximately 1,600 species of flowering plants, including more than 100 species of native trees; 200 species of birds; 80 species of fish; 60 species of mammals; and 31 species of salamanders (Nichols 2004).

The Little River Lumber Company was founded in 1900 to log the Little River drainage. By 1903, the company had constructed a large sawmill at Townsend, in Tuckaleechee Cove southwest of Elkmont. By 1908, the company had extended a railroad line through the Little River's narrow

East Prong gorge to property it purchased at Elkmont. The community of Elkmont soon developed as an “important facility for both railroad and lumbering operations,” as it constituted the point at which logs were transferred from the geared engines used in steep topography to the rod engines used on the flatter run between Elkmont and Townsend (Schmidt and Hooks 1994). Although the railroad was built to transport timber, the railroad company began promoting its use by encouraging recreationists to come to the mountains. Hunting and fishing were two of the most popular activities, as the area provided trout, bear, deer, and small game.

The Little River Lumber Company promoted development of the cutover land and, in 1910, deeded approximately 50 acres along Jakes Creek, just upstream from the community of Elkmont, to the Appalachian Club, chartered as a sportsman’s club. The lumber company retained timber and mineral rights, while the Appalachian Club constructed a clubhouse at its own expense. The club’s membership consisted primarily of sportsmen from Knoxville’s business community, but it later became increasingly centered on social activities. Eventually, prominent citizens, primarily from Knoxville, Maryville, and Chattanooga, became club members. Some of the members began to build cottages near the clubhouse.

The town of Elkmont included homes inhabited by lumbermen and their families. It also had a general store, post office, boarding house, church, and theater. Around 1911, the Wonderland Park Company, created by C.B. Carter and his two brothers, purchased a 65-acre piece of land north of the town of Elkmont. The following year, the Carters constructed the Wonderland Park Hotel. In 1915, after the sale of the hotel and adjacent land and buildings to a group of Knoxville citizens, a new private club was formed called the Wonderland Club. Initially, the club was open only to its members, who used the area for recreational pursuits, including hunting, fishing, and hiking on nearby trails.

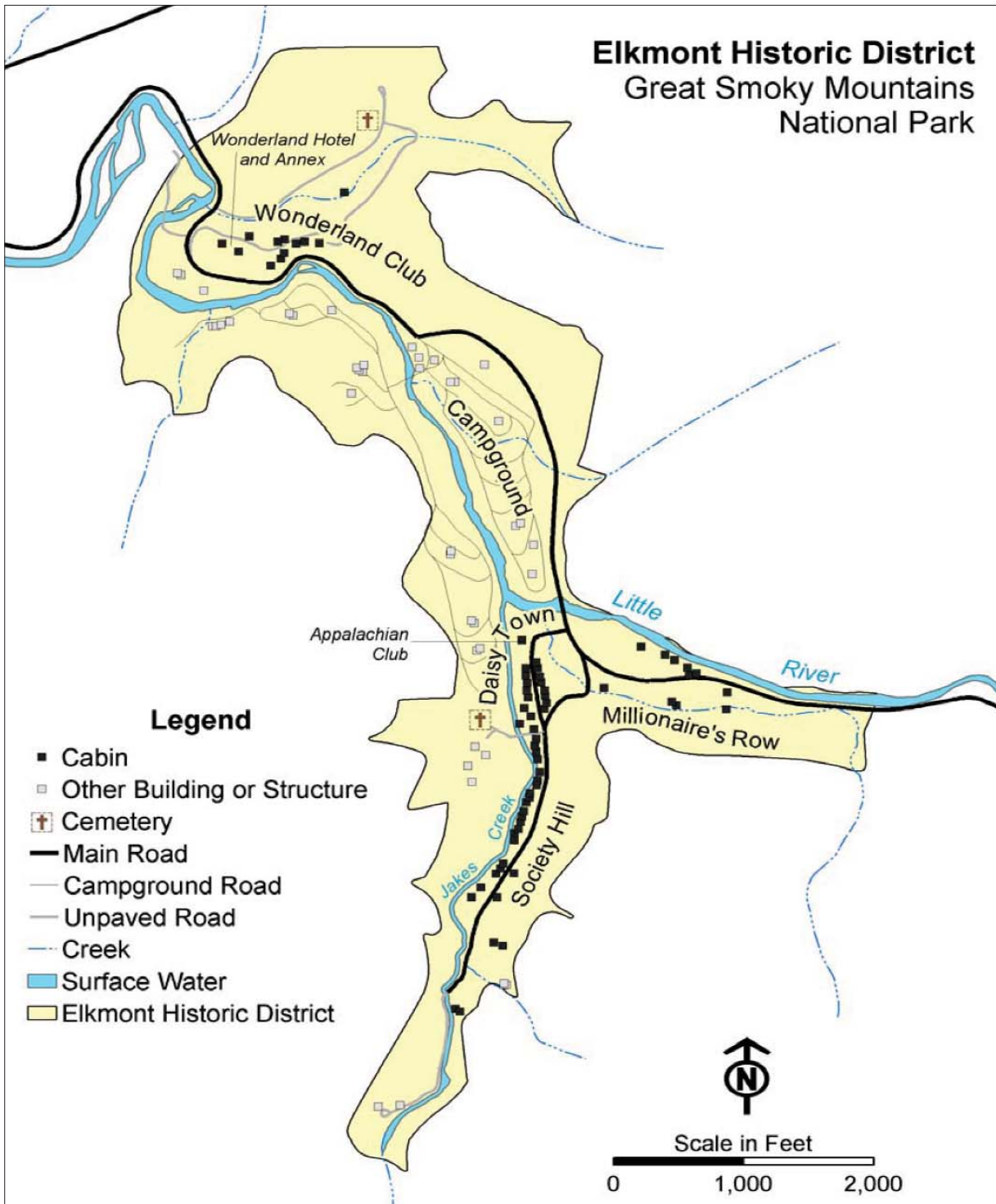
Although it was built in 1912 as an exclusive membership club, the Wonderland Club opened its hotel to the public several years later. Conflicts between residents of the Elkmont area developed at the time that the National Park Service was considering establishment of a new national park. These conflicts arose between those who wanted the area to be managed as a national forest and those who wanted the land preserved as a national park. Eventually, the national park proposal prevailed (Thomason *et al.* 1993; Cleveland 2004).

During the 1920s and 1930s, when the states of North Carolina and Tennessee began acquiring land for the Park, residents of these lands, including those in Elkmont, were offered the option of selling their properties outright or accepting a lesser payment in conjunction with a lifetime lease to the property. Acquisition of this property is described in more detail in Section 1.2.5.

From 1972 until December 1992, the remaining buildings in Elkmont were under the lease of the Elkmont Preservation Committee. With the exception of three buildings vacated in 1996 and 2001, all of the buildings in the District have been vacant since 1992.

Based on direction in the *General Management Plan, Great Smoky Mountains National Park, North Carolina-Tennessee* (NPS 1982b), the National Park Service intended to remove all of the buildings once their leases expired, and allow the area to return to a natural state. However, prior to implementation of this plan, the Elkmont Historic District was nominated to the National Register of Historic Places.

Figure 1-2: Elkmont Historic District



The National Register of Historic Places nomination for the Elkmont Historic District was prepared during the spring and summer of 1993 and was based on survey work undertaken in 1992 and early 1993 (Thomason *et al.* 1993). The District was recommended as significant under National Register of Historic Place's criteria A (event) and C (design/construction). These criteria are described further in Section 1.2.6.

Finalizing the nomination involved intensive consultation and negotiation between the NPS staff at the Park, Southeast Regional Office of the National Park Service, and Tennessee State Historic Preservation Officer to arrive at consensus. During the consultation period, the buildings, structures, and other aboveground features within the District were determined by the agencies to either be contributing or non-contributing components to the District's significance.

In 1994, following determination of the status of the buildings and structures, the Elkmont Historic District was listed in the National Register of Historic Places, with 49 of the 74 buildings determined to be contributing to the District's significance. In general, the boundary of the District follows the 2,400-foot-elevation contour line, but also uses land features such as streams, roads, and trails, and follows the 2,200-foot-elevation contour line along the western border. The boundary was drawn to include the area of the former town of Elkmont that is now occupied by the campground. It also includes land that surrounds existing buildings, structures, and other features, and the area where buildings and structures were formerly located (Thomason *et al.* 1993; Cleveland 2004).

Most of the structures are situated on alluvial (or colluvial) flats and benches along the confluence of Little River and Jakes Creek. The Little River is a pristine waterway and is classified as an "Outstanding National Resource Water." This classification provides legal protection against degradation of its water quality.

A preliminary survey of the area revealed several natural plant communities, including a community type commonly referred to as "montane alluvial forest." Natural communities are described and ranked for rarity in The Nature Conservancy's National Vegetation Classification System. The montane alluvial forest at Elkmont is classified as a very rare, globally imperiled community. These and other features of the District environment are discussed in detail in Chapter 3.

1.2.5 Leases and Other Agreements

During the 1920s and 1930s, when the states of North Carolina and Tennessee began acquiring land for the Park, residents of these lands, including those in Elkmont, were offered the option of selling their properties outright or accepting a lesser payment in conjunction with a lifetime lease to the property. This lifetime lease option was not available until 1932, after many former residents had already sold their property to the Tennessee Park Commission.

By 1950, a desire to bring electric service to the remaining Elkmont lessees was hindered by the impending expiration of leases. Therefore, an agreement was negotiated in 1952 with the Secretary of the Interior under which lifetime leases were exchanged for a common expiration in 1972. The fixed leases gave the power company a 20-year amortization period with a stable customer pool, and electricity was provided to Elkmont.

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In 1972, the Elkmont Preservation Committee was formed for the purpose of negotiating with the federal government for an extension of the leases. The Elkmont Preservation Committee was successful in obtaining a 20-year extension of the leases, to 1992.

In 1992, Elkmont Preservation Committee attempted to secure another lease extension, but was unsuccessful. As a result, on December 31, 1992, when the Elkmont Preservation Committee's lease for use of the hotel and all but three of the cabins expired, the occupants were required to vacate the buildings. The remaining three cabins were not included under the Elkmont Preservation Committee lease, but were occupied under individual leases, which expired either upon the lessee's death or on December 31, 2001.

In 2001, a new planning process was initiated and information was gathered as part of the preparation for an environmental assessment. Because of the complex nature of the issues within the District and the level of controversy surrounding potential project alternatives, the National Park Service elevated the environmental assessment to an environmental impact statement in 2003 to allow for a more in-depth investigation. Through this environmental impact statement planning process, a decision will be made regarding how to manage the District.

The majority of the buildings within the Elkmont Historic District have been unoccupied for more than 10 years. The National Park Service is required to maintain the buildings until a decision is made.

1.2.6 Historical Significance of the Site

The Elkmont Historic District was listed in the National Register of Historic Places on March 22, 1994. It contains two hotel buildings, a social clubhouse, and more than 70 dwellings and outbuildings (Thomason *et al.* 1993). Most of the resort community elements were developed between 1910 and 1925 during the height of lumbering operations in the town of Elkmont. The cabins along the Little River in the Appalachian Club area and three cabins in the Wonderland Club area are the only buildings in the District that were constructed after the lumbering activities based at Elkmont were concluded and the railroad tracks were removed.

The first club that formed at Elkmont was the Appalachian Club (Figure 1-2). This club was started by a group of Knoxville-based businessmen and sportsmen who purchased approximately 50 acres of land, located along the Little River and Jakes Creek, from the lumber company in 1910. Today, this area includes the Appalachian Clubhouse and 60 cabins and outbuildings.

For planning purposes, three areas within the Appalachian Club vicinity have been identified. Although these may not be the historic names of these areas, they are referred to in this document as

- Daisy Town (the area closest to the clubhouse)
- Society Hill (further south and along Jakes Creek)
- Millionaire's Row (the area along the Little River trail located between the river and Bearwallow Branch)

The original Appalachian Clubhouse was destroyed by fire in 1932. It was rebuilt in 1934 based on a design by Knoxville architect Albert Bauman, Jr. Exterior dormer windows have been removed and a newer metal roof has been added. Otherwise, it has been modified very little since that time.

In Daisy Town, there are 22 buildings, 16 of which are contributing resources. Three of these are built around “set-off” houses, referring to their origin as railroad worker’s houses that were literally “set-off” from the railroad flat cars in the Elkmont logging village. Another unusual building is “Adamless Eden,” a log playhouse for children dating to 1921. Levi Trentham was a long-time resident of the Elkmont area who sold land to the Little River Lumber Company. His log cabin was moved from what is now the campground to Daisy Town shortly after his death in 1936.

Cabins in the Society Hill area along Jakes Creek were built between 1910 and 1925. Of the 28 buildings, 18 are considered contributing resources. The Byers/Chapman cabin was given to Colonel David Chapman by the Tennessee Park Commission as an award for his central role in the establishment of the Park.

Millionaire’s Row, built between 1928 and 1940, was the last major area of construction. Residences there were built after the railroad left in 1926. The residences in Millionaire’s Row are larger than most of the cabins in the Appalachian Club area, and several of them had car garages. Millionaire’s Row has eight cabins, six of which are considered contributing resources.

Around 1911, another group of businessmen bought land for the Wonderland Club. The Wonderland Club area is approximately a mile north of the Appalachian Club, east of the Little River and south of its confluence with Catron Branch. There are 10 remaining cabins, the Wonderland Hotel, the annex, and one woodshed in the Wonderland Club. The hotel was built in 1912 and, in 1928, a side extension and large rear wing were added. The annex was built adjacent to the Wonderland Hotel in 1920. Both buildings are typical of the resort hotels built in this era in the southern Appalachians. Of the 10 cabins in the Wonderland Club, 6 are contributing resources.

The period of historical significance for the Elkmont Historic District is from 1908 to 1940. These dates span from the beginning of recreation excursions to Elkmont to the date that the last resort cabin was built. Logging operations at Elkmont ended in 1925, and the automobile was becoming a popular mode of transportation toward the end of this period of historical significance.

The National Register of Historic Places provides general criteria for evaluating significance of buildings and man-made site features more than 50 years of age. The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

- A. are associated with events that have made a significant contribution to the broad patterns of our history;
- B. are associated with the lives of persons significant in our past;
- C. embody the distinctive characteristics of a type, period, or method of construction; or that represent the work of a master; or that possess high artistic values; or that represent a significant and distinguishable entity whose component may lack individual distinction (such as a district); or
- D. have yielded, or may be likely to yield, information important in history or prehistory.

(NPS 1997)

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In addition, National Register Bulletin 16 (NPS 1997) states:

A contributing building, site, structure, or object adds to the historic architectural qualities, historic association, or archeological values for which a property is significant because a) it was present during the period of significance, and possesses historic integrity reflecting its character at that time or is capable of yielding important information about the period; or b) it independently meets the National Register criteria.

A noncontributing building, site, structure, or object does not add to the historic architectural qualities, historic association, or archeological values for which a property is significant because: a) it was not present during the period of significance; b) due to alterations, disturbances, additions, or other changes it no longer possesses historic integrity reflecting its character at that time or is incapable of yielding important information about the period; or c) it does not independently meet the National Register criteria.

The historical significance of Elkmont, the Wonderland Hotel, and the cabins is discussed in the National Register of Historic Places nomination prepared for the District. Section 8 of the nomination states:

The District is significant under Criterion A (historical events) as the only remaining collection of early 20th century resort cabins retaining integrity in the Appalachian Mountains of Tennessee. . . . Elkmont is significant under Criterion A in the area of entertainment/recreation. Elkmont was formed during the outdoor recreation movement of the early 20th century. This movement stressed a return to nature and resulted in the construction of hotels and mountain camps throughout America. The universal enthusiasm of Americans for the “back to nature movement” could be seen in the vast expansion of the national park and forest system under Presidents Theodore Roosevelt and William Howard Taft, the popularity of outdoor adventure stories, creation of the Boy Scouts in 1910 and the Campfire Girls in 1912, and the vogue of bird watching and sportsman’s clubs. In the Southern Appalachians, this renewed interest in outdoor life led to the construction of numerous hotels and mountain cottages Elkmont is probably unique in its permanent long-time association with individuals prominent in the business, professional, social, and civic life of East Tennessee (Thomason et al. 1993).

Elkmont has both local and state significance. Not only is this resource unique in Sevier County, but no similar collection of early 20th century cabins and mountain hotels is known to exist in the Appalachian Mountains of East Tennessee. Other summer resort complexes in the vicinity such as Line Springs and Dupont Springs have been razed, while the resort cabins at Kinzel Springs in Blount County have been modified and no longer retain their historic integrity. The creation of GRSM [the Park] in the 1930s largely halted construction at Elkmont resulting in few changes to its pre-1940 appearance.

The Wonderland Hotel was fairly typical for its time period. However, unlike other resort hotels on commercial rail line or roads, it was located deep within the mountains in an area accessible primarily by train up the Little River, or for the very hearty, by a primitive road over the mountain. The train that led to Elkmont was a logging train that was also used as an excursion train for tourists. As a result, the town became a popular tourist destination.

As National Register Bulletin 15, “How to Apply the National Register Criteria for Evaluation” (NPS 1997) points out, a district can be eligible under Criterion C (design/construction) even if its “components may lack individual distinction.” The nomination for the National Register of Historic Places states:

The Wonderland Hotel and Elkmont cabins are architecturally significant because their forms and plans typify “rural building traditions in the Tennessee Mountains” (Thomason et al. 1993). The buildings illustrate both local craftsmanship and the use of locally available materials (i.e. river rock and locally milled lumber), as well as stock material brought from outside the area (such as windows, doors and hardware). The buildings also “reflect a simplicity of form and function” (Thomason et al. 1993). Porches tie the buildings directly to the surrounding natural landscape, as do the wood and stone building materials. River rock also is used as a landscape feature in retaining walls, walkways, and planters.

While the Elkmont Historic District nomination was listed for “Entertainment and Recreation” and for “Architecture,” there are cultural landscape features visible today that retain historic integrity. These include stone walls, cemeteries, patios, planters, and walkways.

A complete archeological survey of the Elkmont Historic District has not been conducted. However, a phased investigative process has been conducted under the Archeological Resources Protection Act, and under an approved research design in accordance with Section 106 of the National Historic Preservation Act and its implementing regulations. Both prehistoric and historic archeological resources are present, some of which are potentially eligible for the National Register of Historic Places. While archeological resources were not the original reason for the District’s nomination, they are taken into account when developing a management plan. The information they provide contributes to the understanding of the continuum of human occupation within this part of the Park.

Although the Elkmont Campground is located centrally within the District, it is not the focus of this environmental planning process. It was included in the District primarily because it was the site of the logging community of Elkmont, and its inclusion ties the two social clubs together into one geographically contiguous historic resource area.

1.3 ENABLING LEGISLATION AND OTHER RELEVANT LAWS AND POLICIES

This planning process was undertaken in compliance with environmental legislation enacted by the U.S. Congress and under directives issued by the National Park Service. Applicable laws and policies are discussed below.

1.3.1 Organic Act of 1916

The legislation that established the National Park Service is included in 16 *United States Code* 1 - 4; August 25, 1916, chapter 408, 39 Stat. 535. It emphasizes the obligation to ensure that administrative, resource protection, and development actions in parks are consistent with the fundamental purpose of the national park system, which is to conserve park resources and values. The act describes the primary mission of national parks, monuments and reservations as follows:

[The National Park Service] shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations hereinafter specified....by such means and measures as conform to the fundamental purpose of the said parks, monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.

1.3.2 1926 Enabling Legislation

16 *United States Code* 403 created Great Smoky Mountains National Park, as recommended by the Secretary of the Interior’s April 14, 1926 report. Acquisition of park land was funded by public and private donations without expenditure of federal appropriations. The 1926 enabling legislation for establishment of the Park provides a simple statement that the land is set aside for a public park for the “benefit and enjoyment of the people.” The purpose of the Park was previously defined by the 1924 Southern Appalachian National Park Commission

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Report, which set the stage for the enabling legislation and provided six criteria for a park to be located in southern Appalachia, as follows:

1. mountain scenery with inspiring perspectives and delightful details
2. areas sufficiently extensive and adaptable so that, annually, millions of visitors might enjoy the benefits of outdoor life and communion with nature without the confusion of overcrowding
3. a substantial part to contain forests, shrubs, and flowers, and mountain streams, with picturesque cascades and waterfalls overhung with foliage, all untouched by human hands
4. abundant springs and streams available for camps and fishing
5. opportunities for protecting and developing the wildlife of the area, and the whole to be a natural museum, preserving outstanding features of the southern Appalachians as they appeared in the early pioneer days
6. accessibility by rail and road

1.3.3 Management Policies

The Organic Act established the fundamental purpose of all national parks as the conservation of park resources and values. However, the law also provides park managers with some discretion. As stated in Section 1.4.3 of *Management Policies 2006* (NPS 2006), which is the NPS' official guide to managing national parks, "the laws do give the Service the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, so long as the impact does not constitute impairment of the affected resources and values."

NPS management goals and objectives are guided by standards outlined in *Management Policies 2006* and were created to provide direction for the establishment and administration of the national park system. The policies were developed with input from NPS staff and other individuals and organizations that are concerned with the well-being of the parks and the programs they provide. The overriding goal of the *Management Policies* is to thoughtfully carry out the NPS mission (NPS 2006).

1.3.4 NPS Director's Orders

In conjunction with *Management Policies 2006* (NPS 2006), NPS Director's Orders provide guidance regarding park and conservation planning, environmental impact analysis, decision-making, and natural and cultural resource management. Program Standards-Park Planning provides additional planning guidance. NPS Director's Orders that have been consulted in this planning effort include:

- #6: Interpretation and Education
- #12: Conservation Planning, Environmental Impact Analysis, and Decision-Making
- #28: Cultural Resource Management
- #28B: Archeology
- #48: Commercial Services
- #77: Natural Resource Management
- #77-1: Wetland Protection
- #77-2: Floodplain Management

- #83: Public Health
- #87A: Park Roads Standards

A summary of the purpose and intent of each NPS Director's Order is provided in Appendix A.

1.3.5 National Environmental Policy Act

The National Environmental Policy Act of 1969 (42 *United States Code* 4321 - 4370d; Public Law 91-190) was one of the first laws written to establish a broad national framework for protecting the environment. The act ensures that the federal government gives proper consideration to environmental, as well as economic and technical factors, prior to undertaking any major federal action that could significantly affect the environment.

Environmental assessments (EAs) or environmental impact statements (EISs) are required to assess the likelihood of impacts from alternative courses of action (U.S. Environmental Protection Agency 2003). The National Environmental Policy Act directs all federal agencies to utilize a systematic, interdisciplinary approach that employs natural and social sciences and the environmental design art in planning and decision-making that may have an impact on the human and natural environment. Environmental impacts analyzed should include potential direct, indirect, and cumulative effects that could result from implementation of proposed project alternatives. The report should contain a detailed statement by the responsible official that includes:

- the environmental impact of the proposed action
- any unavoidable adverse environmental effects should the proposal be implemented
- alternatives to the proposed action
- the relationship between local short-term uses of the human environment and the maintenance and enhancement of long-term productivity
- any irreversible and irretrievable commitments of resources that would be involved in the proposed action should it be implemented

1.3.6 Regulations of the Council on Environmental Quality

In 1978, the Council on Environmental Quality issued *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act* (40 *Code of Federal Regulations*, Sections 1500 -1508). These regulations assist federal agencies in effectively implementing environmental policy and "action forcing" provisions of the National Environmental Policy Act.

1.3.7 National Historic Preservation Act

By passage of the National Historic Preservation Act (16 *United States Code* 470—470x-6; Public Law 89-665, 96-515), Congress established a comprehensive program to preserve the historical and cultural foundations of the nation as a living part of community life. Section 110 of the National Historic Preservation Act delineates broad historic preservation responsibilities for federal agencies, such as the National Park Service, to ensure that historic preservation is fully integrated into all of their ongoing programs. Important benchmarks for federal agency preservation programs include the following:

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- Historic properties under the jurisdiction or control of the agency are to be managed and maintained in a way that considers the preservation of their historic, archeological, architectural, and cultural values.
- Historic properties not under agency jurisdiction or control but potentially affected by agency actions are to be fully considered in agency planning.
- Agency preservation-related activities are to be carried out in consultation with other federal, state, and local agencies, Indian tribes, and the private sector.

Section 106 of the National Historic Preservation Act requires federal agencies to take into account the effects of their undertakings on historic properties either listed in or eligible to be listed in the National Register of Historic Places. The National Register includes districts, sites, buildings, structures, and objects important for their significance in American history, architecture, archeology, engineering, and culture. Historic properties listed in the National Register can be significant to a local community, a state, an Indian tribe, or the nation as a whole.

The historic preservation review process required by Section 106 is outlined in regulations (36 *Code of Federal Regulations* Part 800, “Protection of Historic Properties”) issued by Advisory Council on Historic Preservation, an independent federal agency established by the National Historic Preservation Act in 1966 to promote the preservation, enhancement, and productive use of our nation's historic resources. The goal of the Section 106 review process is to seek ways to avoid, minimize, or mitigate any adverse effects to historic properties.

Federal agencies are responsible for initiating Section 106 review, most of which takes place between the agency and state and tribal officials. Each State Historic Preservation Officer is appointed by the state's governor and administers the national historic preservation program at the state level, coordinates the state's historic preservation program, and consults with federal agencies during Section 106 review. Federal agencies also consult with officials of federally recognized Indian tribes when tribal lands or historic properties of significance to such tribes are involved, as well as representatives of state and local governments, agencies, and organizations and the general public.

Participation of the Advisory Council on Historical Preservation in Section 106 reviews is determined by whether the proposed project would

- have substantial impacts on important historic properties
- present important questions of policy or interpretation
- have the potential for presenting procedural problems, such as cases with substantial public controversy related to historic preservation issues or that result in disputes among consulting parties that the Advisory Council on Historical Preservation's involvement could help resolve
- present issues of concern to Indian tribes.

Section 106 review encourages, but does not mandate, preservation of historic properties that are listed or eligible for listing in the National Register of Historic Places. The purpose of a Section 106 review is not to stop projects, but to ensure that federal agencies fully consider historic preservation values and the views of other agencies, tribes, organizations, and the public during project planning and decision-making. Sometimes, there is no feasible and prudent way for a needed project to proceed without adversely affecting historic properties, and there may be overriding natural resource concerns or economic and social benefits that make it necessary for such a project to proceed as planned. Section 106 review does, however, ensure that preservation values are factored into federal agency planning and decision-making and that

federal agencies assume responsibility for the consequences of their actions on historic properties and are publicly accountable for their decisions.

1.3.8 The Secretary of the Interior's Standards for the Treatment of Historic Properties

All of the project alternatives propose some level of modifications to the contributing structures within Elkmont Historic District. Because the District was listed in the National Register of Historic Places in 1994, all actions specified in the proposed alternatives must comply with *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (The Secretary of the Interior 2005).

The Secretary of the Interior acts in an advisory role in protecting and preserving all cultural resources listed in or eligible for listing in the National Register of Historic Places. The secretary's standards are the secretary's advice on how to protect a wide range of historic properties. By separate regulation, the secretary has required the application of the standards and guidelines in certain programs administered throughout the National Park Service, including all proposed development grant-in-aid projects assisted through the National Historic Preservation Fund.

The secretary's standards are designed to be applied to all historic resource types included in the National Register of Historic Places, such as buildings, sites, districts, and objects. For buildings, such as those within the Elkmont Historic District, the secretary's standards provide specific guidance on modification of building interiors and exteriors, including acceptable methods of working with building materials such as wood and masonry.

1.3.9 Coordinating National Historic Preservation Act Requirements with National Environmental Policy Act Requirements

Implementing regulations for the National Historic Preservation Act in 36 *Code of Federal Regulations* Part 800 encourage an agency to use the National Environmental Policy Act process and the documents it produces to comply with Section 106 in lieu of the procedures set forth in Sections 800.3 through 800.6. This method streamlines the environmental and historic preservation review process. To use this provision, the following criteria must be met.

- The agency must notify the state and/or tribal historic preservation officer(s) and the Advisory Council on Historic Preservation that it intends to substitute National Environmental Policy Act documentation for National Historic Preservation Act documents.
- The agency must identify consulting parties, such as Indian tribes and Native Hawaiian groups, local governments, and preservation organizations, in a manner consistent with Section 800.3(f).
- The agency must identify historic properties and assess effects on them in a manner consistent with Sections 800.4 through 800.5, but the scope and timing of identification and effect determination may be "phased to reflect the Agency Official's consideration of project alternatives in the NEPA process" and the effort the agency expends must be "commensurate with the assessment of other environmental factors."
- The agency must consult about the action's effects with the state and/or tribal historic preservation officer(s), tribes, Native Hawaiian groups, and other consulting parties during National Environmental Policy Act scoping, analysis, and documentation, and it must involve the public in accordance with the agency's National Environmental Policy Act procedures.

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- The agency must develop alternatives and mitigation measures in consultation with the other stakeholders, and describe these measures in its environmental assessment or environmental impact statement.

Subsection 800.8(c)(2) of 36 Code of Federal Regulations, Part 800 requires that an environmental impact statement be reviewed by the state and/or tribal historic preservation officer(s) and other consulting parties. In response to this requirement, Section 106 consultation has been conducted throughout the preparation of this document. This has included scoping and the identification and assessment of effects on all resources, including cultural resources. Consultation to resolve potential adverse effects identified in the development of this document has occurred with the consulting parties, which have included the

- Advisory Council on Historic Preservation
- The Chickasaw Nation
- The Eastern Band of Cherokee Indians
- Elkmont Preservation Committee
- National Parks Conservation Association
- National Trust for Historic Preservation
- Sierra Club
- Smoky Mountains Hiking Club
- Tennessee Historical Commission, including the State Historic Preservation Officer

Subsection 800.8(c)(4) requires that the measures an agency will take to mitigate adverse effects on historic properties be specified in a record of decision that is written following the final environmental impact statement. In addition, if a memorandum of agreement between the National Park Service and another agency is developed under Section 106, the memorandum of agreement and final comments from the Advisory Council on Historic Preservation will be addressed in the record of decision. The memorandum of agreement would stipulate the measures that the National Park Service would implement to mitigate the adverse effects on historic properties.

1.3.10 Consultation with State and Federal Historic Preservation Agencies

Between 1994 and 1999, the National Park Service proposed three plans for management of the Elkmont Historic District. The plans and resulting responses from the Tennessee State Historic Preservation Officer and Advisory Council on Historical Preservation are briefly described below.

September 1994 Plan. The National Park Service notified the Tennessee Historical Commission, the office of the State Historic Preservation Officer in Tennessee, of its intent to remove all of the buildings, including the contributing structures, in the enclave and outlined plans to perform the mitigation actions required by the National Historic Preservation Act for removal of historic buildings. The State Historic Preservation Officer objected to this plan because of the 1994 listing of many of the buildings in the National Register of Historic Places. The State Historic Preservation Officer indicated that some buildings should be retained for use as interpretive displays to educate the public regarding the history of Elkmont.

October 1996 Plan. The National Park Service proposed preserving three buildings to be used to interpret the history of the Elkmont Historic District and removing all other buildings. The State Historic Preservation Officer objected to this proposal, and suggested that the National Park Service submit a draft agreement among the National Park Service, State Historic Preservation

Officer, and Advisory Council on Historic Preservation that described its preferred action of retaining three buildings and proposed mitigation for removal of the other buildings. The National Park Service submitted a draft agreement in March 1997. The State Historic Preservation Officer objected because his office did not feel that the proposed plan would address the need for adequate interpretive materials to educate the public about Elkmont's history and ended consultation with the National Park Service.

October 1999 Plan. In 1998 and 1999, the Park staff, along with officials from the NPS' Washington and Southeast Region offices, developed a proposal to preserve 17 cabins and the Appalachian Clubhouse. At the same time, the National Park Service allocated \$160,000 to be used to stabilize the clubhouse and the 17 cabins. This proposal was sent to the Advisory Council on Historic Preservation and the Tennessee State Historic Preservation Officer in October 1999. The Advisory Council on Historic Preservation responded that the NPS proposal constituted a new action and required new consultation. The new action also initiated the National Environmental Policy Act process, which led to the current *General Management Plan* amendment and environmental impact statement.

1.3.11 Special Populations

The National Park Service must make provisions to accommodate the needs of any special populations who visit the Elkmont Historic District. Special populations include people with sight, hearing, learning, or mobility impairments; visitors who do not speak English; and young children and the elderly.

In accordance with *Management Policies 2006*, "the National Park Service will provide persons with disabilities the highest feasible level of physical access to historic properties that is reasonable, consistent with the preservation of each property's significant historical features. Access modifications for persons with disabilities will be designed and installed to least affect the features of a property that contribute to its significance."

The Department of the Interior has adopted design standards for buildings and other facilities. The Department of the Interior adopted these standards in response to strong public interest in obtaining access to all public facilities for those with disabilities.

As of May 8, 2006, the relevant requirements for the National Park Service regarding visitors with disabilities are included in the Architectural Barriers Act Accessibility Standards.

1.4 GOALS AND OBJECTIVES

The overall goal for this project is to develop a full range of management alternatives under the National Environmental Policy Act, compare potential impacts that would result from implementation of each of the alternatives, and develop an achievable management plan that considers public comment in addition to NPS regulations, policies, and guidelines. The basis of the alternative development process was a series of goal statements for the Elkmont Historic District. The primary goal of this planning process, identified through public participation, is to *foster enjoyment, understanding, appreciation, and protection of natural and cultural resources both within the Elkmont Historic District and Park-wide by:*

- creating opportunities for emotional and intellectual connections to these resources

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- protecting and perpetuating the significant and diverse natural resources and ecosystems (including forest communities and water resources) found within the Elkmont Historic District, keeping them free from impairment
- protecting and perpetuating the tangible (archeological sites, historic building and structures, landscapes, and other features) and intangible (feelings of attachment and family life, myth, folklore, and ideology) aspects of the cultural resources that comprise the District

1.4.1 Interpretive Themes and Goals

Resource education themes and goals for the Elkmont Historic District were developed cooperatively with input from Park staff and the public. They were based on the Park's *Comprehensive Resource Education Plan* (NPS 2001a) and considered the history and contributions to the Park made by the District. The overall interpretative goal is to *provide visitors with an understanding of the significant cultural and natural resources within the Elkmont Historic District through educational programs/activities and media that interpret and discuss the following topics:*

- the history of a national park movement in the Great Smoky Mountains from the 1890s to 1934, including the issue of whether to designate the area as a national park or national forest, utilizing the stories of individuals such as Colonel David Chapman and James B. Wright, who held opposing viewpoints but both owned Elkmont properties
- the growth of a local and regional tourist resort industry, including the “back to nature” movement of the early 20th century, which helped fuel the Park idea, from the 1890s to the present
- the logging industry's impact on the forest resources in the Smoky Mountains and, in particular, the significance of the Little River Lumber Company in the formation of the Elkmont community, Elkmont's evolution as a summer resort, and the establishment of the Park
- the architectural styles of the Elkmont structures that predominantly made use of native materials and exemplify simplicity of form and function
- preservation of cultural resources in a Park designated for its natural wonders, evident in the NPS' integration of historic preservation with the continuation of natural processes

Visitor education programs and services provided at Elkmont must also fall within the scope of the Park's major themes of diversity and abundance, refuge of scenic beauty, and a continuum of human activity.

1.4.2 Management Objectives

As stated in the *General Management Plan, Great Smoky Mountains National Park, North Carolina-Tennessee* (NPS 1982b), the objective is to “manage the Park in a manner consistent with the purpose of preservation, enjoyment and benefits to humankind through scientific study of its distinctive combination of natural and cultural resources.”. The *General Management Plan* includes management objectives prepared by the Park superintendent for each of the Park's resources. During the process of developing new alternatives, the goals and objectives specific to resources at Elkmont were refined to reflect current management direction. The sections below provide both broad and specific direction for resources within the Elkmont Historic District.

1.4.2.1 Cultural Resources

The *General Management Plan* (NPS 1982b) includes five management objectives for cultural resources in the Park.

- Identify, evaluate, protect, and preserve the Park's cultural resources in a manner consistent with legislative and executive requirements and NPS historic preservation policies.
- Reduce, to the degree possible, deterioration of historic structures that are determined, through objective evaluation, to merit long-term preservation for interpretive or other purposes.
- Preserve historic structures associated with pioneer life, such as log residences, churches, schools, and barns.
- Reduce and, as possible, eliminate the modern developments known to adversely affect archeological resources of the Oconaluftee-Deep Creek area and those not necessary to the direct support of essential Park programs.
- Ensure that cultural resources and settings are maintained in a manner compatible with natural resource management objectives.

As part of the development of project goals and objectives, more specific cultural resource goals and management objectives were developed for the Elkmont Historic District by the National Park Service with input from the public. Consistent with NPS policy, the proposed goals and objectives for cultural resources of the District include the following:

Take into account the total context of impacts to the cultural resources present, above and below ground, and avoid or minimize these impacts if possible.

- Maximize opportunities for adaptive reuse of resources at the Wonderland Club and Appalachian Club areas as a means of meeting identified Park administrative and visitor use needs.
- Ensure that the selected alternative retains buildings, other structures, and component landscapes in clusters and associations sufficient to provide a sense of character of the District.
- Foster opportunities for thematic interpretation of the history and significance of the District and its contribution to the history of the Park.

Other considerations for cultural resources include the following:

- Any historic resources selected for preservation should serve an agency need and should be adequately maintained.
- Any human remains or funerary objects or objects of cultural heritage are to be treated in accordance with the provisions of the Native American Graves Protection and Repatriation Act and any other applicable laws and regulations.
- Any traditional cultural property located within the District will be protected. Traditional cultural properties are most often, but not necessarily, associated with Native American cultures. They are ethnographic resources that are listed or eligible for listing in the National Register that, for at least two generations, are associated with cultural practices or the beliefs of a living community that are rooted in that community's history or are important in maintaining its cultural identity (NPS 1998a). To date, no traditional cultural properties have been identified within the District.

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1.4.2.2 *Natural Resources*

Management actions must be consistent with legislative and executive mandates and with NPS policies. To accomplish this, the *General Management Plan* (NPS 1982b) included the following components for implementing resource management strategies:

- Protect and perpetuate the significant and diverse natural resources and ecosystems (including forest communities and water resources), keeping them as free as possible from the adverse influences of human intrusion.
- Protect and, where possible, restore the natural processes as they would proceed if they had never been influenced by non-Indian society.
- Ensure adequate protection for threatened or endangered species; critical habitat; and unusual or particularly vulnerable natural resources of the Park, such as virgin forest, brook trout habitat, beech gaps, and outstanding cove hardwood stands.
- Minimize, to the extent possible, the adverse impact of exotic plants (such as mimosa, kudzu, Japanese honeysuckle, tree-of-heaven, and princess tree) and animals (such as European wild boar, rainbow trout, and brown trout) on the Park's natural resources and processes.
- Manage the Park as a core unit of the Great Smoky Mountains International Biosphere Reserve.

The National Park Service has identified additional management goals relevant to management of the Elkmont Historic District. These include:

- Protect streams, seeps, wetlands, and floodplains.
- Provide water resource management methods consistent with responsibilities outlined for Outstanding National Resource Waters.
- Protect montane alluvial forest and its ability to regenerate.
- Avoid loss of habitat for the synchronous firefly population.
- Ensure that visitor use levels are maintained within the level that natural resources have the ability to sustain.
- Minimize areas of disturbance and maximize the use of previously disturbed areas.

1.4.2.3 *Visitor Use and Experience*

Guiding principles for visitor use and experience are to promote visitor activities at appropriate locations, levels, and times that minimize adverse impacts on Park resources, while achieving educational goals and ensuring that visitor access, such as trails, to adjacent use areas is adequately maintained.

The primary goal for visitor use and recreation is to foster enjoyment, understanding, appreciation, and protection of natural and cultural resources within the Elkmont Historic District and throughout the Park by creating emotional and intellectual connections to these resources. The following objectives will aid in achieving that goal:

- Ensure that "traditional" recreational opportunities, including support facilities that are currently enjoyed by the public are provided for adequately.
- Ensure that visitor education programs and services fall within the scope of the Park's major themes of biodiversity, scenic beauty, and a continuum of human activity.
- Recognize the opportunities for the cultural resources of the Elkmont Historic District to aid in interpretation of the Park's origins.
- Identify, design, and implement educational activities and media that interpret the unique cultural resources found within the Elkmont Historic District.

- Provide visitors with an understanding of the significance of the cultural resources within the Elkmont Historic District.

1.4.2.4 Interpretation

Interpretation in the Park involves conveying natural and cultural information to the public in way that incorporates discussion of the resources' values. Management objectives that are included in the *General Management Plan* (NPS 1982b) for interpretation include the following:

- Demonstrate by actions the NPS' concern for Park resources and the environment beyond Park boundaries, and show that low-impact activities can be practical and pleasant.
- Make all resource information available in forms that benefit and provide enjoyment for each of the primary visitors to the Park, including the scientist, historian, drive-through visitor, interested amateur "specialist," employee, and neighbor.
- Adequately inform visitors and potential visitors of the opportunities and limitations presented by the Park in advance of, and during, visits, and the means of using the Park safely and responsibly.
- Convey to visitors, neighbors, and the nation a sense of the tangible and intangible values associated with the great diversity of the Park's living organisms, the unique combination of extent and accessibility of its wilderness sanctuary, and the extraordinary remnants of Native American and pioneer culture found within it.

1.5 IMPACT TOPICS

Impact topics are those special resources or management policies that could be affected by the management alternatives for the Elkmont Historic District. The impact topics relevant to the alternatives analysis are based on laws, policies, regulations, and comments made by the public during the scoping process.

Impacts may be direct (at the same time and place as the proposed action) and/or indirect (occur later in time or farther in distance than the action), and must be examined for their cumulative effect, which is the incremental environmental impact of the action, together with impacts of other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Impacts also have to be assessed in terms of sustainability and long-term management. This means that the impact analysis must examine the relationship between the short-term implementation of an alternative and the long-term productivity of the resources within the Elkmont Historic District. The impact analysis must also identify any irreversible or irretrievable (permanent) commitment of resources and any adverse impacts that could not be avoided.

The following section provides a discussion of the broad impact topics identified during project scoping as appropriate for analysis of each management alternatives for the Elkmont Historic District. There also is a discussion of some impact topics that commonly are addressed, but that were not considered in this plan for the reasons given.

1.5.1 Cultural Resources

Cultural resources are aspects of a cultural system that are valued by or significantly representative of a culture or that contain significant information about a culture. A cultural

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resource may be a tangible entity or a cultural practice. Tangible cultural resources are categorized as districts, sites, buildings, structures, and objects that are listed in or eligible for listing in the National Register of Historic Places.

The National Park Service classifies cultural resources as archeological resources, cultural landscapes, structures, museum objects, and ethnographic resources. The three cultural resource categories listed below were considered in the impact analysis portion of this study. Museum objects and ethnographic resources were dismissed from further consideration for the reasons described in Sections 1.5.6.5 and 1.5.6.6.

- Archeological resources: any material remains or physical evidence of past human life or activities that are of archeological interest, including the record of the effects of human activities on the environment.
- Cultural landscapes: a geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, that was associated with a historic event, activity, or person or that exhibits other cultural or aesthetic values.
- Structures: a constructed work (usually immovable by nature or design, although some have been relocated and others are mobile by design) that was consciously created to serve some human activity.

More discussion of how the National Park Service views these cultural resources is provided in the NPS' *Cultural Resource Management Guideline* (NPS 1998a).

1.5.2 Natural Resources

Management of many components of the natural environment at the Elkmont Historic District is specified by laws and policies. For example, the National Park Service must manage endangered or threatened species in accordance with the Endangered Species Act, while floodplain management and wetland protection must be consistent with Executive Orders 11988 and 11990, respectively.

The National Environmental Policy Act process can incorporate the consultation requirement of Section 7 of the Endangered Species Act. The executive orders concerning floodplains and wetlands direct the National Park Service to avoid, to the extent possible, both long- and short-term impacts to those resources. Wetlands and floodplains are important resource components of the Elkmont Historic District. Wetlands and floodplains are also under the jurisdiction of the U.S. Army Corps of Engineers, which is responsible for implementing the regulatory process provided for by Section 404 of the Clean Water Act.

Management of natural resource also considers other guidance, policy, and regulations that deal with natural resource protection, including impacts to air and water quality, noise levels, aquatic habitat and fisheries, terrestrial resources including forest communities, wildlife, and the presence of invasive plant or animal species. Geology and soils also are impact topics, because certain activities depend on the geology and the ability of the soils to accommodate or withstand particular land uses.

1.5.3 Interpretation and Visitor Use

Interpretation and visitor use are topics key to the development of a General Management Plan amendment that addresses the future of the Elkmont Historic District. Interpretation is consistent with one of the purposes of the Park, “to preserve its exceptionally diverse natural and cultural resources and to provide for public benefit from and enjoyment of those resources in ways that will leave them basically unaltered by modern human influences” (NPS 2001a).

Three themes form the basis of the Park’s Comprehensive Resource Education Plan: diversity and abundance, a continuum of human activity, and a refuge of scenic beauty (NPS 2001a). Because of given its abundance of natural resources and its cultural legacy, the Elkmont Historic District provides a place within the Park where these themes can be interpreted for the public. Specifically, the District provides opportunities to view remnants of historic land uses of the region representative of the logging, railroad, and vacation community prior to establishment of the national park. Planning for interpretation and visitor use at the Elkmont Historic District is based on laws, the NPS’ management policies (NPS 2006), the Park’s Comprehensive Resource Education Plan (NPS 2001a), and intensive public input and comment solicited during the scoping and project planning phases.

1.5.4 Land Use, Access, and Circulation

Great Smoky Mountains National Park is one of the most highly visited national parks in the country. Annual visitation has been between 9 and 10 million for much of the last decade (NPS 2004b). Over the past 10 years, about two percent of the Park’s visitors were of international origin. Because it is a major attraction for visitors from throughout the nation and around the world, the Park has been an economic stimulus for development of western North Carolina and east Tennessee.

The Park is easily accessible from many of the major population centers of the eastern United States. The gateway communities of Gatlinburg, Cosby, Cherokee, and Townsend have traditionally provided lodging and dining facilities to Park visitors. (Besides backcountry and campground overnight facilities, including the remote Le Conte Lodge, no commercial overnight lodging is available in the Park.)

Elkmont is easily accessible to Park visitors. It is located near the Sugarlands Visitor Center, and is close to Gatlinburg and Townsend. A 1996 visitor use study found that 43 percent of summer visitors and 41 percent of fall visitors entered the Park through the Gatlinburg entrance (Littlejohn 1997). A substantial number of visitors, particularly those staying for less than a day, use trails and/or trailheads that originate at Elkmont, and would likely use the recreational, interpretive, or other visitor facilities or uses that could be included in the management plan. Therefore, potential impacts to the gateway communities, and on the resources found within the District, were retained as an impact topic.

1.5.5 NPS Operations

Some of the current operations at Elkmont include law enforcement, operation and maintenance of the campground, operation of the existing wastewater treatment plant and water supply system, maintenance of existing roads and trails, removal of exotic invasive vegetation, treatment of hemlocks to fight the woolly adelgid infestation, stabilization of the contributing structures, and visitor education activities. Concessioner management also is included in NPS operations.

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Because of the potential of the alternatives to affect current operations within Elkmont and Park-wide, NPS operations were retained as an impact topic.

Concession operations can provide visitor services that are determined to be necessary and appropriate for the public use and enjoyment of a park. These services can be provided under contract to the NPS by a concessioner that charges a fee to the user. Examples of visitor services are lodging, campgrounds, food service, merchandising, tours, recreational activities, guiding, transportation and equipment rental, sale of interpretive materials, and the conduct of interpretive programs.

Any concessions operation within the Elkmont Historic District would have to be necessary and appropriate, meeting criteria provided by NPS concession law. The primary legislation controlling the necessary and appropriate determination is in Title IV of the National Parks Omnibus Management Act of 1998 (Public Law 105-391). This law provides that the Director of the National Park Service can solicit and enter into contracts to provide visitor services. The policy of Congress and the Secretary of the Interior provides the basis of concession contracts (36 *Code of Federal Regulations*, Section 1, Subsection 51.2). Visitor services can only be provided under safeguards so that they will not “unduly impair park values and resources” and are “limited to locations that are consistent to the highest practicable degree with the preservation and conservation of the resources and values of the park.” Visitor services also must be deemed “necessary and appropriate for the public use and enjoyment of the park in which they are located.”

Section 10.2 of *Management Policies 2006* (NPS 2006) deals with concessions planning as part of commercial visitor services and provides further guidance. Even though the Park does not have a commercial services plan, commercial services planning “will be integrated into other plans and planning processes and will comply with all service policies regarding planning and environmental analysis” (NPS 2006).

Planning processes that consider authorizing or expanding a park concession will need to ensure that the facility or service:

- is consistent with enabling legislation, and
- is complementary to a park’s mission and visitor service objectives, and
- is necessary and appropriate for the public use and enjoyment of the park in which it is located, and
- is not, and cannot be, provided outside park boundaries, and
- incorporates sustainable principles and practices in planning, design, siting, construction, and maintenance, and
- adopts appropriate energy and water conservation, source reduction, and environmental purchasing standards and goals, and
- will not cause unacceptable impacts.

During the alternatives development process, some members of the public expressed a desire to use the cabins and other buildings within the Elkmont Historic District for overnight lodging and dining. If implemented as part of an alternative, this visitor use would be provided under a concession’s contract. As such, it would be subject to the policies and procedures that govern park concessions. as described later in this document.

Two of the alternatives for management of the Elkmont Historic District would include visitor services that would involve lodging, dining, and related facilities operated by a concessioner.

Based on the requirements described above, overnight accommodations and food services must be restricted to the kinds and levels necessary and appropriate to achieve Park purposes. In general, they should be provided only when they cannot adequately be provided in the vicinity of the Park. Such services may be justified when the distance and travel time to accommodations and services outside the Park are too great to permit reasonable use, or when leaving the Park to obtain incidental services would substantially detract from the quality of the visitor experience (NPS 2006).

1.5.6 Impact Topics Dismissed from Further Analysis:

This section briefly describes potential impact topics that were dismissed from further analysis because they do not apply to the proposed project alternatives or are not known to exist within the Elkmont Historic District or the larger area of potential impact.

1.5.6.1 Energy Requirements and Conservation Potential

Scoping did not reveal energy requirements or energy conservation as a topic of concern. None of the alternatives would result in substantial changes in energy use within Great Smoky Mountains National Park.

1.5.6.2 Socioeconomic Environment, including Population

Facilities removal, site restoration, and/or construction activities associated with the alternatives would have short-term beneficial effects on employment in the area. Depending on the alternative, these activities would produce up to a few tens of jobs. In some alternatives, the operation of new lodging and dining opportunities would provide a small number of long-term jobs. However, compared to a county labor force of more than 56,000 people, these jobs and the income they produced would not be detectable. Similarly, the availability of fewer than 75 additional lodging rooms in a county that has more than 25,000 guest rooms would not result in measurable effects on the economy and would not result in any population changes. For these reasons, socioeconomics and population were eliminated from further consideration.

1.5.6.3 Environmental Justice

Executive Order 12898 directs federal agencies to assess whether their actions would have disproportionately high and adverse human health or environmental effects on minority and low-income populations.

Elkmont is located within the boundaries of the publically owned Great Smoky Mountains National Park, surrounded by undeveloped natural areas, with no private in-holdings, and is therefore uninhabited by members of the general public. As a result, there are no minority or low-income populations living within or directly adjacent to the project area and area of potential effects.

Potential impacts of the alternatives on the natural and physical environment beyond the boundaries of the Park would not disproportionately adversely affect any minority or low-income population or community, or be specific to such populations or communities. Impacts to traffic, water quality, and air quality would equally affect all populations outside the Park.

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The developments and actions of the alternatives would not result in any identifiable adverse human health effects. Therefore, there would be no direct or indirect negative or adverse health effects on any minority or low-income population or community.

No predicted effects would potentially disproportionately affect tribal resources, such as treaty protected resources, cultural resources, and/or sacred sites.

The planning team actively solicited public input as part of the planning process and gave equal consideration to all comments from persons regardless of age, race, income status, or other socioeconomic or demographic factors.

Based on this information, environmental justice was dismissed from further consideration as an impact topic.

1.5.6.4 Prime and Unique Agricultural Lands

Prime farmland has been designated by the U.S. Department of Agriculture as having the best combination of physical and chemical characteristics for the production of food, feed, forage, fiber, and oilseed crops. Prime farmland refers to the productive capacity of the land for crops as affected by soil fertility, growing season and moisture supply. Unique agricultural land is land, other than prime farmland, that is used for production of specific, high-value food and fiber crops. Unique agricultural areas have the special combination of soil quality, location, growing season, and moisture supply needed to produce sustained high quality and/or high yields of a specific crop when treated and managed according to modern farming methods. Both of these categories require that the land is available for farming uses. Lands within the District are not available for farming and, therefore, cannot meet these definitions.

1.5.6.5 Sacred Sites

Executive Order 13007, released in 1996, states that “in managing Federal lands, agencies must (1) accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and (2) avoid adversely affecting the physical integrity of such sacred sites.” Confidentiality of the site location is also required by this Executive Order. In accordance with Executive Order 13007, the tribes were consulted and invited to provide information regarding the existence of sacred sites within the Elkmont Historic District. No such information was provided. Because there are no known sacred sites in the District, this issue is not discussed further in the environmental impact statement.

1.5.6.6 Indian Trust Resources

Indian trust assets are assets that the United States holds and administers for Indian tribes. The federal Indian trust responsibility is a legally enforceable, fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights. It also represents a duty to carry out the mandates of federal law with respect to American Indian and Alaskan Native tribes. There are no Indian Trust resources within the District; therefore, this topic was eliminated from further consideration.

1.5.6.7 Museum Objects

Museum objects include prehistoric and historic objects, artifacts, works of art, archival material, and natural history specimens that are part of a museum collection. No such objects were identified as part of this process and, therefore, this topic was eliminated from further consideration.

1.5.6.8 Ethnographic Resources

Ethnographic resources are defined by the National Park Service as any “site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it” (NPS 1998a). There are no known ethnographic resources at or near the vicinity of the Elkmont Historic District.

American Indian tribes traditionally associated with the lands that are now within Great Smoky Mountains National Park were informed by letter of the proposed action in spring 2002 and have been in consultation with the Park since that time. The National Park Service did not receive any comments from any of the tribes regarding the existence of ethnographic resources within the study area. Copies of the draft environmental impact statement were forwarded to each associated tribe or group for review and comment. Copies of the final environmental impact statement also will be provided to each associated tribe or group for review and comment. If subsequent issues or concerns are identified, appropriate consultations will be undertaken.

No known ethnographic resources would be affected, and appropriate steps would be taken to protect any human remains, funerary objects, sacred objects, or objects of cultural patrimony that inadvertently were discovered. Therefore, ethnographic resources were dismissed as an impact topic.

Alternatives, Including the Environmentally Preferred and Agency Preferred Alternative



2.0 ALTERNATIVES

This chapter describes how the National Park Service developed the alternatives for the management of the Elkmont Historic District. It then describes the features that are common to all of the alternatives.

Each alternative is described in detail, including the concept, land protection measures, management approaches for cultural and natural resources, and interpretation and visitor uses that would be associated with the alternative. For alternatives where it is relevant, the description includes facilities development with detailed site plans. A summary of costs is provided for each alternative, with more detailed cost information presented in Appendix B.

Regardless of the alternative that is selected, the National Park Service would incorporate mitigation that would avoid or minimize the effects of project implementation on resources. Mitigation measures are described for cultural resources, natural resources, and construction procedures.

Several suggested actions were not examined in this environmental impact statement. These actions are briefly identified, with an explanation of why they were not incorporated into any of the alternatives.

The chapter identifies the environmentally preferred alternative. It then provides tabular presentations of project features that facilitate comparisons among the alternatives. Another table summarizes the impacts of the alternatives.

The descriptions of alternatives use terminology consistent with that in *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (The Secretary of the Interior 2005). To facilitate an understanding of the alternatives descriptions, the definitions of treatments from this source are provided in the glossary at the end of this document.

The existing conditions of the District are shown in Figure 2-1. References to buildings and last leaseholder names on this map and elsewhere in this document are consistent with those listed in the District's 1994 National Register of Historic Places nomination, even though the public involvement process revealed some discrepancies in the last leaseholder name for several buildings. The figures that depict the alternatives only identify the last leaseholder names for those buildings proposed to be retained under that alternative.

2.1 ALTERNATIVES DEVELOPMENT

Development of alternatives for the management of the Elkmont Historic District was based on the project goals and objectives, an assessment of Park needs, and public input. The alternatives presented in this environmental impact statement are intended to represent a full range of possible actions that would address the purpose and need for the project.

During scoping, the National Park Service solicited public input on the content of the alternatives. Input was also strongly encouraged from within the National Park Service and from the consulting parties, which represent long-standing stakeholders in the issues surrounding Elkmont. The

2.0 ALTERNATIVES

primary issues identified during scoping centered on the preservation of buildings, restoration of natural communities, protection of water quality, and relevance of introduced commercial services. The alternatives presented in this chapter present a range of approaches for addressing these issues.

The National Park Service developed project goals and objectives based on protection of cultural and natural resources, and on providing visitor opportunities. The National Park Service also considered potential uses for the District, which involved examining park needs to determine if the proposed uses were compatible with the project goals and objectives, and looking at the constraints and opportunities presented by the District's terrain (such as inability to expand roads adjacent to the Little River), its natural and cultural resources, and its location within the Park. The resulting potential uses for the District were then considered along with uses identified by the public and the consulting parties.

Seven alternatives, described later in this chapter, were developed to provide a full range of management options for the District. These alternatives include

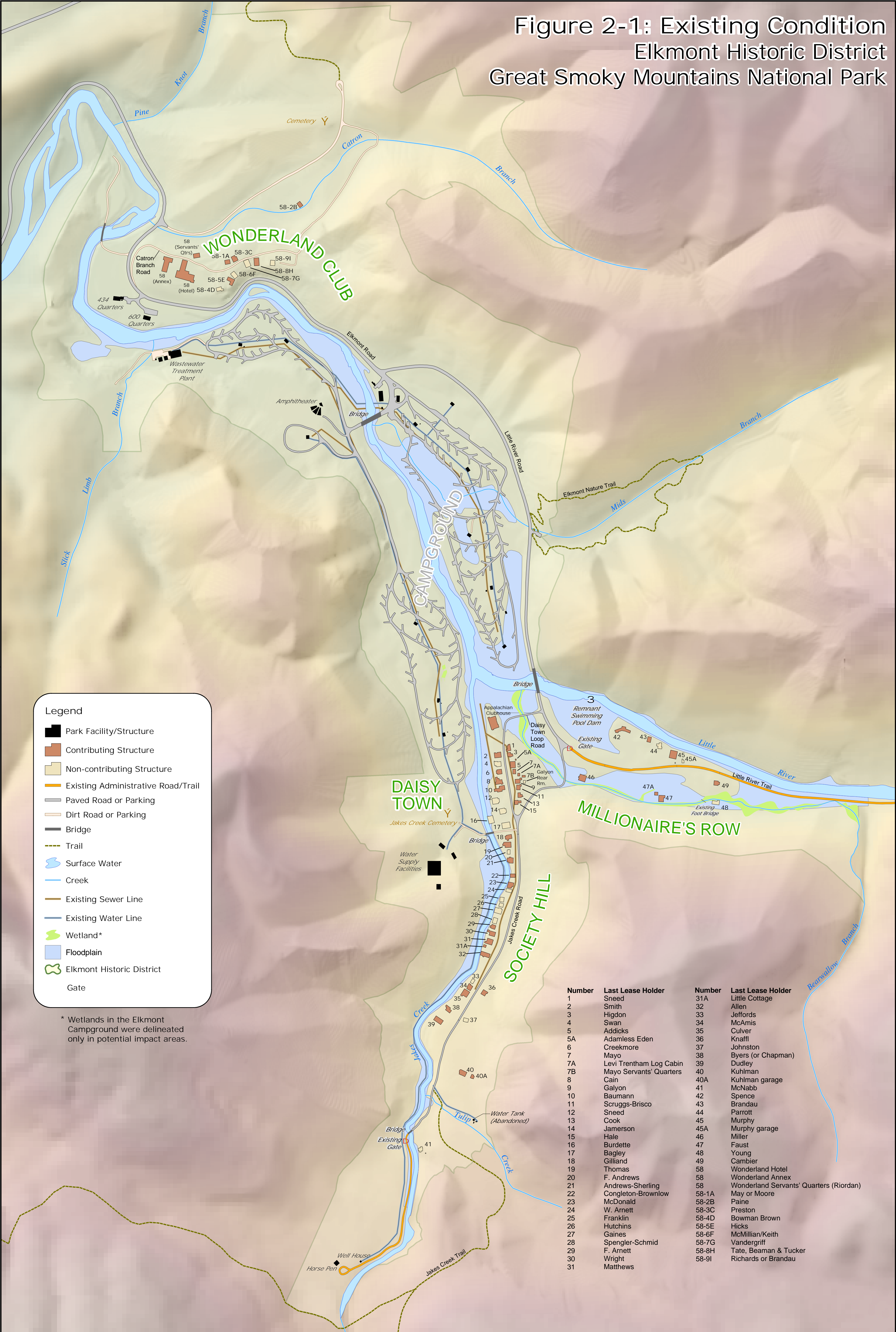
- the No Action Alternative that conforms with the approach stipulated in the Park's *General Management Plan* (NPS 1982b), as required by the National Environmental Policy Act
- a second alternative, designated Alternative A, that follows the *General Management Plan* but adds active natural resource management to remove non-native species and to promote forest restoration
- five alternatives, designated Alternative B through Alternative F, that propose varying degrees of increased preservation of contributing structures within the District and their use for a variety of purposes

The project alternatives were initially presented at public information meetings held on March 8 and 9, 2004 in Gatlinburg and Knoxville, respectively. They were revised for the public review in the draft environmental impact statement in 2006 and were reviewed in public information meetings held on March 25 and 27, 2006 in Gatlinburg and Knoxville, respectively.

2.1.1 Public Involvement

Development of alternatives for management of the Elkmont Historic District incorporated extensive public involvement opportunities, which are summarized in Chapter 5. As part of the National Environmental Policy Act process, all issues identified by the public were recorded and considered by the Elkmont planning team. The project alternatives resulted from development of goals, study of potential uses, and formulation and review of conceptual alternatives that resulted from public involvement.

Figure 2-1: Existing Condition
Elkmont Historic District
Great Smoky Mountains National Park



2.1.2 Potential Uses Considered

Parties contributing to the consideration of potential uses included NPS Park, technical, and management staff; the general public; and the consulting parties. Each potential use was subjected to the following examination:

- Which NPS or legislative mission, mandates, and/or policies does it meet and which does it violate?
- How does it meet the District's goals, objectives, and mandates for visitor education, natural resources, and/or cultural resources?
- Does the National Park Service have the authority to implement the use? If so, what authority?
- Who are the users?
- How many users will benefit?
- What is the frequency of use?
- Is there a socioeconomic impact (positive or negative) to the Park's gateway communities?
- How does the use fit with the current use of the District? How does it conflict?
- Are there other suitable places for this use? If so, where?
- Are there partnership opportunities? If so, with whom?
- Has capital funding been identified?
- What are the potential funding sources?
- What are the operational impacts?
- Is the proposed use economically viable? Would federal or other funding be required?
- Could the use be supported by existing infrastructure? If not, what additional infrastructure would be needed?
- What are the traffic, transportation, and/or people circulation impacts?
- Which buildings could be adapted for this use?
- What design elements would be required to meet Architectural Barriers Act Accessibility Standards for compliance with the Americans with Disabilities Act?
- Would the implementation of the use be short-term or long-term?

Following a design charrette in July 2002, the proposed uses remaining under consideration included the following:

Park administrative uses:

- curatorial facility for archival storage and research purposes for the Park's artifact and historical collections, with an estimated need of 13,000 square feet
- housing for visiting scientists
- resource management facility to consolidate personnel
- additional headquarters' office and meeting space to relieve the crowded conditions at Sugarlands
- Great Smoky Mountains Association administrative offices

Visitor education/recreation uses:

- Discover Life in America Museum at the Wonderland Hotel
- museum community (such as at Cades Cove)
- Appalachian crafts and music facility
- interpretive facility and/or museum at the Appalachian Clubhouse
- self-guided walking tour
- additional traditional recreation opportunities, such as hiking, fishing, and wildlife watching

2.0 ALTERNATIVES

- overnight adult education facility to support Great Smoky Mountains Institute at Tremont
- university extension and/or educational network facility
- group day use facility under special use permits

Visitor service uses:

- rental cabins
- retreat facility
- dining facility
- hotel
- store and/or gift shop
- campground shower facility, electrical hookups, and a restroom facility for day users

Public comment on the conceptual alternatives supported many of the proposed uses, particularly those that provided additional visitor services or educational and recreational opportunities.

Proposed uses that were favored included reuse of the Wonderland Hotel and Annex as a hotel with dining facilities; cabin rental; use of the Appalachian Club as a day use facility and, possibly, for dining by those staying at the nearby cabins; and use of three cabins along the Little River as a visitor center, museum, and educational facility. Public comments also demonstrated that strong public support still exists for the direction provided in the *General Management Plan* (NPS 1982b), which calls for all buildings to be removed and return of the area to a natural condition.

2.1.3 Potential Uses Eliminated from Consideration

Initially, the National Park Service eliminated all uses that were not appropriate for the District, based on its geographic location within the Park, the constraints of its road network, or limitations on undertaking a private or agency use within a public area. In subsequent reviews, other uses were eliminated, as follows:

- The proposed use by the Great Smoky Mountains Association was eliminated because it would be inefficient for the organization to store materials within the District and subsequently transport them to the Sugarlands Visitor Center.
- The proposed use for Park headquarters' additional office and meeting space was eliminated because of the inefficiency in communication and lost time for travel between Sugarlands and the District.
- The proposed use for a resource management facility was eliminated for these same reasons.
- Potential use as an Appalachian crafts and/or music facility was eliminated because there are other locations in the Park and in the surrounding region that provide crafts and music. In addition, these types of activities are not dependent on the history and development of Elkmont for their interpretation.
- Uses solely dealing with campground issues, such as campground shower facility, electrical hookups, and campground store, were eliminated because they could be evaluated as part of the campground program independent from considerations of the rest of the District.

The remaining uses were integrated into the conceptual alternatives.

As part of public meetings, additional new uses were suggested. These included eliminating private vehicle use beyond the campground entrance, providing parking for remote shuttling near the Wonderland Hotel, and placing a historic railroad engine used for logging at the Wonderland Hotel with a railroad exhibit.

- Park management subsequently determined that the Wonderland Hotel would not be a suitable location for a museum because public access to this area would be constrained by its location and lack of space for parking.
- The proposed logging and railroad exhibit was eliminated from further consideration because there are other places within the Park where the story of the logging industry and its impact on Park lands could be more effectively presented to a larger audience.
- Minimal rehabilitation of the cabins for use as rustic shelters for campers was considered, but was dismissed based on sanitary considerations.

2.1.4 Partnerships

In accordance with NPS policy, the National Park Service cooperates with partners to extend the benefits of natural and cultural resource conservation and outdoor recreation throughout this country and around the world. The National Park Service may seek opportunities to enhance the protection and preservation of natural and cultural resources within the parks and outside its administrative limits by working cooperatively with other public agencies, Native American tribes, and private landowners. Preservation of ecosystems may be more effective when the National Park Service works with other entities that have similar objectives.

The National Park Service also pursues partnerships with other agencies and groups to minimize the impacts of land management practices and other activities initiated outside Park borders. Some external threats to Park resources include noise, loss of visibility of night skies because of emissions from artificial lighting, contamination of water, unsustainable allocation of water resources, air pollutants, wetland destruction and degradation, adverse impacts on visual quality, loss of habitats for endangered or threatened species, and the spread of invasive species (NPS 2000). Although the National Park Service may consider future partnerships with other groups or agencies to benefit management of the Elkmont Historic District, the National Park Service has not yet entered into any partnership arrangements for the District.

2.2 FEATURES COMMON TO ALL ALTERNATIVES

The seven project alternatives analyzed in this document are described in detail later in this chapter. Even with the intent to provide a wide range of alternatives, some elements, described below, are common to all of the proposed approaches for managing the Elkmont Historic District.

2.2.1 Buildings to Be Removed under All Alternatives

All of the alternatives would include the removal of specific buildings because of their non-contributing status and/or deteriorating condition. Eleven non-contributing buildings and one contributing building are proposed to be removed under all alternatives.

- In Daisy Town, they include the Galyon outbuilding (#9A), Sneed (#12), Jamerson (#14), Burdette (#16), and Bagley (#17).
- In Society Hill, they include Gaines (#27) and Knaffl (#36-contributing).
- In Millionaire's Row, they include Parrot (#44), Murphy garage (#45A), and Young (#48).
- In the Wonderland Club, they include Bowman/Brown (#58-4D) and McMillian/Keith (#58-6F).

2.0 ALTERNATIVES

2.2.2 Continuation of Natural Resources Management Activities

Several types of natural resource data would continue to be collected annually from the Little River to characterize the aquatic ecosystem, including water quality, and species and distribution of fish and benthic invertebrates. Stream characteristics that would continue to be assessed relating to water quality include temperature, conductivity, flow, mean width, gradient, and pH. Fisheries data include characteristics such as estimates of young-of-the-year populations, estimates of adult populations, species diversity and biomass, total population estimates, and total biomass. These data help managers determine the health of the system and may alert them to problems, such as introduction of a non-native species previously unknown in the park.

Current Park management policy includes treatment to eradicate non-native species. Sixteen non-native species have been identified in the District, some of which were introduced by former residents and now exist as cultural elements. Because of the invasive nature of these plants and the threats they pose to native populations, these species would be eradicated.

2.2.3. Additional Interpretation

All of the action alternatives would include the installation of two wayside exhibits. One would be placed in the Elkmont Campground and would provide a description of the history of the town of Elkmont. The second would be placed in Millionaire's Row and would include a description of the District's synchronous firefly population. Other exhibits are proposed for Alternatives B through F, and are included in each alternative description.

2.2.4 Wastewater Management

2.2.4.1 Antidegradation Requirements

The conceptual approach to addressing the treated wastewater discharge in the Little River for all of the alternatives was to comply with the Outstanding National Resource Waters designation through the Tennessee Antidegradation Statement contained in Chapter 1200-4-3 of the "General Water Quality Criteria" of the *Rules of the Tennessee Water Quality Board*. Although there would be no additional amount of pollutants discharged to the Little River and no degradation of the current water quality associated with wastewater discharge under any of the alternatives, the Tennessee Antidegradation Statement also implies that no additional increase in hydraulic capacity of wastewater treatment systems currently discharging to the Little River would be allowed. Therefore, alternatives that require an expansion of the existing plant (Alternatives E2, F1, and F2) could not be accommodated within the District unless a treatment strategy would be implemented that did not result in direct discharge to the Little River.

2.2.4.2 Wastewater Management Options

Alternatives B through F all propose various levels of upgrades to the wastewater treatment system to accommodate the need created by additional visitor use of the District. Strategies that were considered for providing wastewater collection and treatment services associated with these the alternatives included

- individual septic collection with subsurface infiltration, drip irrigation, or pressure mound disposal

- construction of holding basins for pump and haul to a local wastewater treatment facility
- connection to the existing wastewater system

The first two strategies are described in Section 2.11, Actions Eliminated from Further Study. The approach of connecting to the existing wastewater system, which would be used for all alternatives that required the management of additional wastewater, is described below.

2.2.4.3 Connecting to the Existing Wastewater System

Alternatives B through F would expand the area receiving wastewater service and would increase wastewater flows. The techniques used to extend the existing wastewater collection system would depend on the site circumstances, as follows:

- A gravity collection system would be constructed where practical, based on topography.
- In areas where topography would not provide gravity flow, individual grinder pump stations with small-diameter force mains could be located at each structure receiving wastewater service. The wastewater would be pumped into a central gravity collection line or a larger pressure force main.
- Alternately, wastewater would flow by gravity collection lines from each structure receiving wastewater service to a large, centrally-located wastewater pump station. From there, it would be pumped via a pressure force main to a point where it could again flow by gravity.

The use of pumping equipment would increase the operation and maintenance costs of the system. However, pressure force main piping can generally be installed with much less ground disturbance and at a lower capital cost than gravity collection lines because the force mains usually are smaller than gravity piping and do not have to maintain a steady slope. Individual grinder systems would be cost effective for a system serving a relatively low number of buildings that are more removed from the collection system and where gravity sewer lines are not possible, based on topography.

2.2.4.4 Flow Equalization

Based on the estimated wastewater flows generated by Alternatives B through E1, it may be possible to meet treatment demand by installing a flow equalization basin upstream from the existing treatment process. Because the Elkmont area is used by campers and day use visitors, the plant experiences strong flow fluctuations several times during the day, and but has low flows at other times during the day and throughout the night. The construction of a flow equalization basin would effectively increase the plant capacity by storing peak inflows and treating the wastewater after the peak had subsided. The basin would also allow the plant to treat flows at a more constant rate, which would improve treatment process effectiveness.

2.2.4.5 Recommended Wastewater Plan

For Alternatives B through E1, which would not exceed permitted discharge levels, the recommended strategy for providing wastewater service would be to

- connect to the existing wastewater collection system within the District
- install a flow equalization basin at the existing wastewater treatment plant

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This strategy would provide the most cost-effective solution in managing wastewater without additional pollutant loadings to the Little River. It also would make better use of the existing, available capacity of the wastewater treatment plant.

For the larger wastewater flows that would result from Alternatives E2, F1, or F2, it would be necessary to expand the wastewater treatment capacity. Environmental regulations prohibit expansion of the hydraulic capacity of the existing plant. To legally accommodate the additional wastewater, discharge would have to occur at another location. However, for the purposes of this environmental analysis, an expanded treatment facility was considered, and the impacts are described in Chapter 4 as environmental consequences of the alternatives, as appropriate.

Tennessee Department of Environment and Conservation standards for discharging wastewater into Tier III streams within Tennessee recently became more stringent, following guidance from the U.S. Environmental Protection Agency. As a result of these increased standards, the Park is exploring methods for reducing total discharge into the Little River from the Elkmont wastewater treatment facility under existing conditions as part of a separate investigation. Alternative treatment methods may include the addition of a drip irrigation system located in a suitable area outside the District, if an appropriate location with the required soil properties can be identified. Pending the results of such a future study, the additional wastewater generated under Alternatives E2, F1, and F2 may be accommodated along with existing wastewater, but until that time, wastewater generated as part of these alternative options would be restricted to the existing treatment facility.

2.2.5 Calculation of Additional Water Requirements

Alternatives B through F would require additional water supply to meet increased visitor use of the Elkmont Historic District. For all of these alternatives, the following factors were used to calculate the volumes of additional water demand and wastewater generation.

Ratio of Water Demand to Wastewater Generation. Water demand in the Elkmont area is about 25 percent greater than the volume of wastewater produced. Factors that contribute to this condition at Elkmont include the following.

- Some of the water piping in the area is old, and leakage occurs from the pressurized water system into the ground.
- Within the campground, visitors fill water jugs or buckets and carry the water to their campsites for activities such as dishwashing. Many visitors then discard the used water onto the ground, rather than carrying it back to the utility sinks or other drains in the area that lead to the wastewater treatment plant.
- Campers and day users fill water jugs and water bottles and transport the water away from the source for consumption elsewhere.
- Outdoor spigots are conducive to play and waste, particularly by children or on hot days.

Because all of these conditions would continue, it was assumed for all of the alternatives that water demand would be 25 percent greater than the volume of wastewater produced.

Restroom Use. For public restrooms, wastewater would be generated at the rate of 2.6 gallons per use. Based on the relationship provided above, this would result in water demand of 3.25 gallons per use.

Use by Visiting Scientists in Cabins. Visiting scientists would be using cabins primarily at night and in the early morning, and would not have hotel-like amenities such as maid service. They were estimated to use water at the rate of 62.5 gallons per day per scientist and generate wastewater at the rate of 50 gallons per day per scientist.

Use by Public Lodgers. Public lodgers in the hotel, annex, and cabins may use their rented rooms throughout the day. Concessioner employees at these facilities also would use water and generate wastewater. Therefore, a water demand value of 75 gallons per day per guest, with wastewater generation of 60 gallons per day per guest, was used for these facilities.

Use by Restaurant. The restaurant at the Wonderland Hotel would use 5,000 gallons of water per day.

Use for Indoor Fire Suppression. To meet state building codes, all day use and overnight facilities would be equipped with a fire suppression (sprinkler) system meeting the National Fire Protection Act 13R standard. The fire suppression system would be designed to confine a fire to a single compartment (room), and would have a minimum of one sprinkler head for every 144 square feet of a compartment or part thereof. This system must discharge at least 18 gallons per minute to an individual sprinkler head or 13 gallons per minute per sprinkler head simultaneously, for 30 minutes, to all of the sprinklers within the compartment. For rooms larger than 576 square feet, a maximum of four sprinkler heads are considered in the design. Based on these criteria, water requirements for systems of various sizes would be as follows:

- one sprinkler head X 18 gallons per minute X 30 minutes X 1.25 system loss factor = 675 gallons
- two sprinkler heads X 13 gallons per minute X 30 minutes X 1.25 system loss factor = 975 gallons
- three sprinkler heads X 13 gallons per minute X 30 minutes X 1.25 system loss factor = 1,463 gallons
- four sprinkler heads X 13 gallons per minute X 30 minutes X 1.25 system loss factor = 1,950 gallons

2.3 NO ACTION ALTERNATIVE (GENERAL MANAGEMENT PLAN APPROACH)

2.3.1 CONCEPT

The National Environmental Policy Act requires consideration of a “no action” alternative to describe what would happen if current management direction were to continue into the future. The alternative of no action implies that no change in activity would be undertaken and that existing management practices would be sustained. Taking no action at Elkmont is tiered to, and incorporates the direction of the Park’s *General Management Plan* (NPS 1982b), which calls for removal of all of the contributing structures within the District and allows for natural regeneration of plant communities.

The buildings within the District would be removed using mechanical equipment or by hand. Most remnants of building foundations and stonework could remain as a link to the past occupation of the District. The building sites would then be returned to a natural state.

No changes to modern Park buildings, such as those associated with the campground and Quarters 434 and 600, would occur. These buildings are not related to the Appalachian or Wonderland Clubs and were constructed after the District’s designated period of significance.

Table 2-1 summarizes the proposed treatment for all buildings under the No Action Alternative. The alternative is illustrated on Figure 2-2.

Table 2-1: Buildings Summary for the No Action Alternative

Area/Buildings	Status	Uses
Wonderland Club Area		
Wonderland Hotel	Remove	Natural regeneration of plant communities
Annex	Remove	Natural regeneration of plant communities
Cabins	Remove all	Natural regeneration of plant communities
Millionaire’s Row	Remove all	Natural regeneration of plant communities
Daisy Town		
Appalachian Clubhouse	Remove	Natural regeneration of plant communities
Cabins	Remove all	Natural regeneration of plant communities
Society Hill	Remove all	Natural regeneration of plant communities

2.3.2 Land Protection

Land protection plans are developed by the National Park Service to ensure that protection of Park resources is provided for in the management objectives for an area. The No Action Alternative would provide land protection by being consistent with the Park’s mission in preservation of natural resources and some cultural resources. Natural resources would be protected by returning building sites to a natural state following removal of buildings and other structures. Although the contributing structures would be removed, some cultural landscape features and archeological

2.0 ALTERNATIVES

resources would remain as a link to the past human occupation of the District. 2.3.3 Cultural Resource Management

The *General Management Plan*, which is the basis for the No Action Alternative, states “Significant cultural resources will be preserved and studied. Buildings, sites, and objects representative of the Appalachian folk culture will continue to be interpreted” (NPS 1982b). However, Elkmont was not identified as having significant cultural resources when the *General Management Plan* was adopted in 1982, and it was not listed in the National Register of Historic Places as a District until 1994. While Elkmont is listed in the National Register for local and state significance, it is not representative of what is considered the “Appalachian folk culture” within this part of the country. Elkmont represents two private communities characteristic of a 1910 to 1920s rustic resort development within the southern Appalachian Mountains.

The *General Management Plan* also states, “Less significant historic features that do not qualify for the National Register will be allowed to undergo natural deterioration, and the sites will be reclaimed by natural processes” (NPS 1982b). Consistent with this policy, the management direction for Elkmont, as specified in the *General Management Plan*, called for removal of the buildings and returning the building sites to a natural state. This was the proposed plan for Elkmont until it was listed in the National Register of Historic Places in 1994.

While the Elkmont Historic District does not represent “Appalachian folk culture,” the identification of historic properties is, and should be, an ongoing process. As time passes, scholarly and public thinking about the historical significance of specific cultural resources will change. Therefore, even when an area has been completely surveyed for historic properties of all types, it may require re-investigation if many years have passed since the survey was completed. Such follow-up considers re-evaluation of properties, such as Elkmont, based on new information or changed historic perspectives.

While the No Action Alternative would remove all of the buildings in the Elkmont Historic District, some culturally significant features, such as remnants of building foundations, stonework, and other visible cultural deposits, would remain as a link to the past occupation of the District.

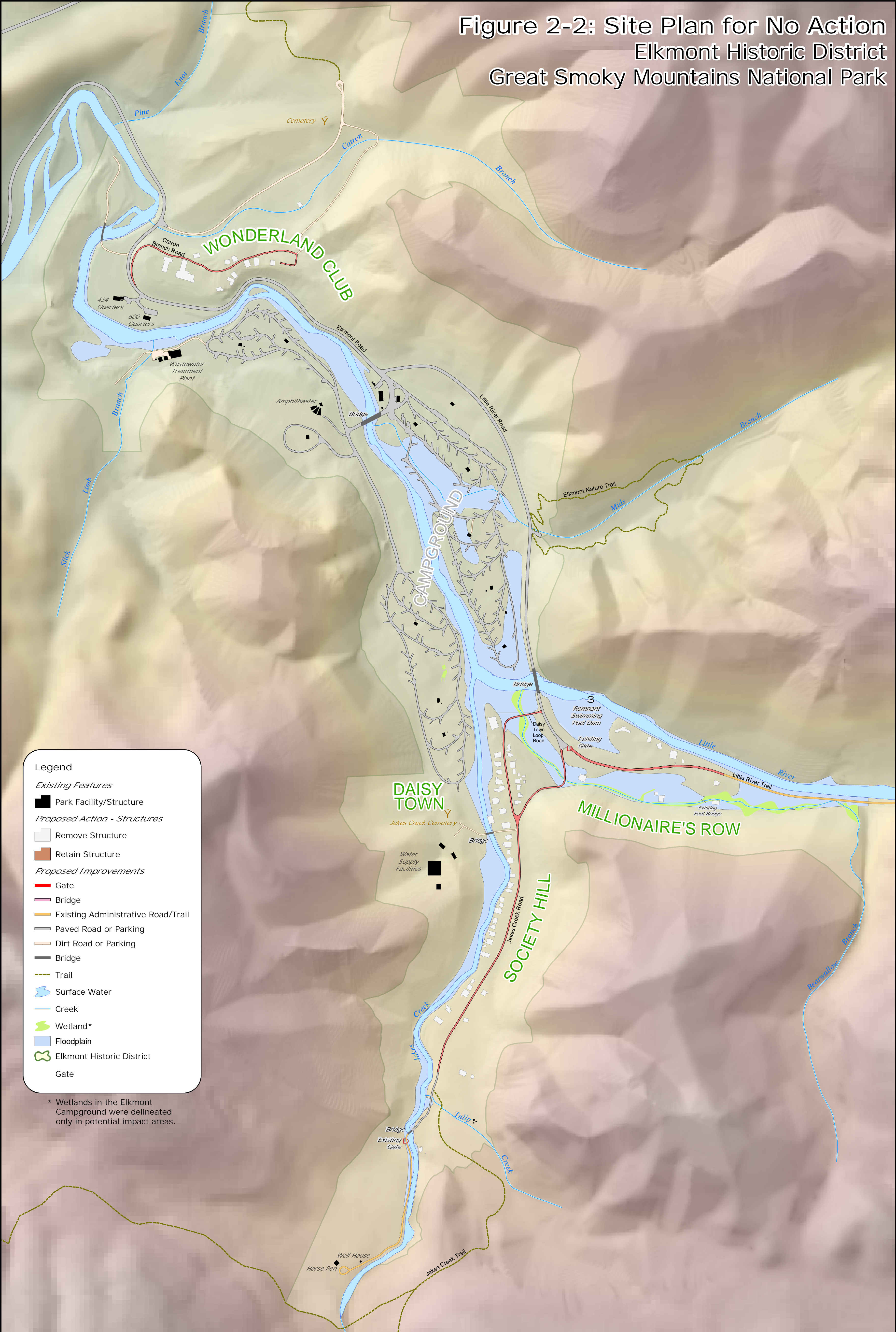
With the removal of the buildings, a decrease in ranger patrols, Park operations, and staffing specific to Elkmont are anticipated. This would result from the elimination of the need to stabilize the contributing structures and provide visitor protection services related to building hazards.

2.3.4 Natural Resource Management

The *General Management Plan* indicates that “Special management will generally be given to endangered or threatened species and to species or systems having particular scientific or aesthetic value and/or fragility. This will be accomplished by diverting or eliminating human activities or non-native species that may threaten these features or by allowing or compensating for natural occurrences on which some communities and species depend” (NPS 1982b).

At Elkmont, as in the rest of the Park, natural resource management includes identifying or locating species or specific features that may have particular value or vulnerability that the Park deems in need of special management. The No Action Alternative proposes to continue these monitoring activities throughout the District. Current management policy also includes treatment to eradicate

Figure 2-2: Site Plan for No Action
Elkmont Historic District
Great Smoky Mountains National Park



Legend

Existing Features

■ Park Facility/Structure

Proposed Action - Structures

□ Remove Structure

■ Retain Structure

Proposed Improvements

— Gate

— Bridge

— Existing Administrative Road/Trail

— Paved Road or Parking

— Dirt Road or Parking

— Bridge

— Trail

— Surface Water

— Creek

— Wetland*

— Floodplain

— Elkmont Historic District

— Gate

* Wetlands in the Elkmont Campground were delineated only in potential impact areas.

non-native species. Under the No Action Alternative, non-native species management would continue at its current level.

The No Action Alternative would not generate any additional wastewater discharge or nonpoint runoff into the Little River or its tributaries. It would maintain current levels of development within floodplains. Visitor use activities that could potentially tax site carrying capacity would be maintained at current levels. Consistent with guidance provided in the *General Management Plan*, the No Action Alternative would allow for natural regeneration of forest in areas where buildings are removed.

2.3.5 Interpretation and Visitor Use

According to the *General Management Plan*, the objective of interpretive efforts is to demonstrate to visitors the value of the Park as a sanctuary from some of the effects of the modern, technological world and to show how the special qualities of such a sanctuary relate to and benefit people. Opportunities to view the Park by driving, hiking, picnicking, camping, and fishing all occur within the District. These opportunities would continue to be available to all visitors if the No Action Alternative was implemented.

The No Action Alternative would allow regeneration of ecosystems and recovery from past logging and human occupation. It would provide visitors with opportunities to learn about the natural resources that comprise Elkmont, and would maintain existing levels of traditional recreation, such as hiking and camping.

2.3.6 Facilities Development with Detailed Site Plans for the No Action Alternative

Changes to facilities that would occur with the No Action Alternative are summarized in Table 2-2. All of the contributing structures would be removed either by mechanical means or by hand removal. Foundations and other features that could serve as a link to the past human occupation of Elkmont could remain if they did not present a safety hazard to visitors. Former building sites would be revegetated in accordance with guidance provided in the *General Management Plan*. Reestablishment of vegetation would provide soil stabilization and act as a deterrent to erosion and subsequent sedimentation into surrounding water bodies, floodplains, wetlands and other sensitive natural areas.

No infrastructure improvements would be necessary in this alternative. In accordance with the *General Management Plan*, roads that were damaged during project implementation would be repaired and other roads would be maintained as needed. Once required repairs were made, no additional operation and maintenance expenditures would be necessary for these roads beyond those funds presently budgeted for the operation and maintenance of existing roads within the District.

2.3.7 Estimated Development Costs

The estimated total one-time capital cost for implementation of the No Action Alternative is \$1,493,875. The estimated annual operating costs for implementation of the No Action Alternative are \$58,898. All estimates are in 2010 dollars. An itemized list of costs and post-construction

2.0 ALTERNATIVES

operation and maintenance costs is provided in Appendix C. Total costs of the No Action Alternative are based on funds necessary to perform:

- Building removal
- Infrastructure maintenance, including existing road repairs
- Vegetation management

Table 2-2: Summary of Implementation Elements for the No Action Alternative

Element	Action
Use of contributing structures	None; remove all contributing structures.
Measures for buildings retained	None; remove all contributing structures.
Natural resources management	Continue current management activities, including hemlock pest management, non-native vegetation management, water quality monitoring, and fish population assessment.
Visitor use	Maintain current visitation levels and activities, such as camping, fishing, hiking, and other compatible recreation.
Interpretive features	No changes to existing interpretive features.
Access / circulation	No changes to existing access or circulation.
Parking	No parking improvements or changes.
Utilities	No changes to existing utilities.
Landscape treatment	Retain foundations, rock walls and other cultural features where they do not pose a safety hazard to visitors.
Park operations and staffing	Decrease ranger patrols, Park operations, and staffing by eliminating the need to stabilize the contributing structures and provide visitor protection related to building hazards. Continue the current level of maintenance for existing infrastructure.

2.4 ALTERNATIVE A

2.4.1 Concept

The Elkmont Historic District contains unique plant communities and natural features because of its location within and adjacent to the Little River floodplain. The river and its associated plant communities provide habitat for a variety of native animals that contribute to the Park's biodiversity. This alternative would provide active restoration and management to facilitate the reestablishment of native plant communities.

Alternative A would remove all buildings, as outlined in the *General Management Plan*. This could involve either mechanical removal or removal by hand. Building foundations and stonework above the ground level also would be removed.

Interpretive features would be installed to further educate visitors on the natural and cultural history of the District. They would include a wayside exhibit at the Elkmont Campground, describing the history of the Town of Elkmont, and a wayside exhibit in the Millionaire's Row area with information on the District's synchronous firefly population.

As in the No Action Alternative, long-term management of invasive and/or non-native plant species would continue. However, Alternative A would include a more intensive effort to inventory and eradicate non-native species.

Table 2-3 summarizes the proposed treatment for all buildings under Alternative A. The alternative is illustrated on Figure 2-3.

Table 2-3: Buildings Summary for Alternative A

Area/Buildings	Status	Uses
Wonderland Club		
Wonderland Hotel	Remove	Active restoration and management of native plant communities.
Annex	Remove	Active restoration and management of native plant communities.
Cabins	Remove all	Active restoration and management of native plant communities.
Millionaire's Row	Remove all	Active restoration and management of native plant communities.
Daisy Town		
Appalachian Clubhouse	Remove	Active restoration and management of native plant communities.
Cabins	Remove all	Active restoration and management of native plant communities.
Society Hill	Remove all	Active restoration and management of native plant communities.

2.0 ALTERNATIVES

2.4.2 Land Protection

Alternative A would provide land protection by being consistent with the Park's mission in preservation of natural resources and some cultural resources. Natural resources would be protected by actively restoring native plant communities at all former building sites. Although the contributing structures would be removed, some cultural landscape elements, such as stone bridges and other features that would require ground disturbance to be removed, would remain as a link to the past human occupation of the District.

2.4.3 Cultural Resource Management

This alternative focuses on natural resource restoration and would protect very little of the cultural resources in the District. Known archeological sites would be protected to the greatest extent practicable during natural resource restoration activities. Building remnants such as foundations and stonework would be left in place only in those instances where removal would create unacceptable disturbances to the natural environment. Appendix C provides measures to avoid potential impacts to shallow archeological deposits and recommendations for specific buildings or groups of buildings.

2.4.4 Natural Resource Management

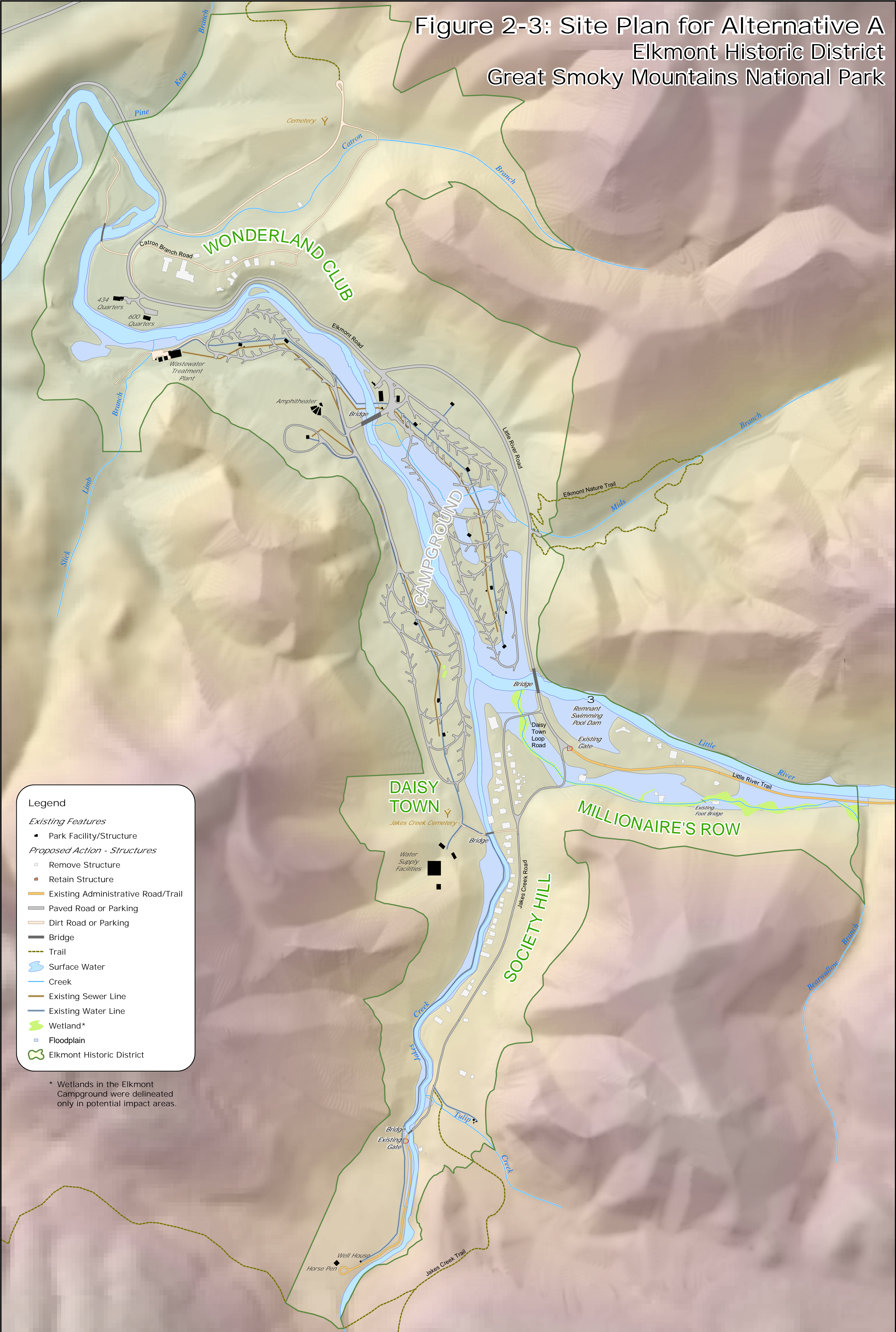
Alternative A would actively restore native plant species throughout the Elkmont Historic District. Active restoration would include seeding and planting with native species collected in the District, followed by vegetation management. Active restoration of native plant communities would increase species diversity, improve and increase wildlife habitat, and provide soil stabilization. Management would be performed annually to prevent invasion by non-native species and to promote the establishment of native plant communities. The need and focus of the non-native species management plan for the area would be reassessed as conditions necessitate.

Past use of the Elkmont area for farming, logging, and construction of buildings and roads resulted in considerable disturbance of plant communities within the District over the past century. Activities such as planting ornamental species, rerouting Bearwallow Branch, driving or parking automobiles off paved roads, and deposition of refuse and other materials caused additional disturbance. Features of the District that would be addressed by Alternative A would include soil disturbance, loss of tree canopy, and the presence of non-native species.

The globally imperiled montane alluvial forest plant community, which historically existed within the floodplain, experienced substantial losses from logging and construction of the District buildings. Where appropriate conditions exist, reestablishment of this plant community would be promoted.

Non-native species that compete with native species would be identified and eradicated. A District-wide inventory of non-native species has been completed, and the National Park Service currently treats several non-native species that were identified in the inventory. Additional information on non-native species is provided in Chapter 3. Alternative A would dedicate additional funding for management planning and staff to implement a comprehensive plan, implemented annually, to eradicate non-native species throughout the District. The goals of this management plan would be to

Figure 2-3: Site Plan for Alternative A
Elkmont Historic District
Great Smoky Mountains National Park



- create conditions suitable for native plant communities to thrive by reducing competition from non-native plant species
- actively treat hemlock communities to protect against woolly adelgid infestation
- revegetate disturbed areas with plant materials relocated from within the District to eliminate sites for potential non-native species encroachment
- provide for long-term soil stabilization and erosion deterrence
- increase suitable habitat for wildlife species within the District

Alternative A would not generate any additional discharge into the Little River or its tributaries from the sewage treatment plant or from nonpoint surface water runoff from impermeable surfaces. No additional structures or activities are proposed within the 100-year floodplain. Active restoration and long-term management of montane alluvial forest areas is proposed for sites where buildings are removed. Visitor use activities would continue at existing levels. Pedestrian circulation would be restricted to existing roads, which would help minimize impacts to natural systems.

2.4.5 Interpretation and Visitor Use

According to the *General Management Plan*, the objective of interpretive efforts is to demonstrate to visitors the value of the Park as a sanctuary from some of the effects of the modern, technological world and to show how the special qualities of such a sanctuary relate to and benefit people. Opportunities for hiking, picnicking, camping, fishing and viewing the Park by driving all exist within the District. These opportunities would continue to be available to all visitors if Alternative A was implemented.

Interpretive features would be included under Alternative A. Wayside exhibits would describe the history of the town of Elkmont and the natural history of synchronous fireflies. The interpretive brochure currently available at the Elkmont Nature Trail would be revised to include historical information about Elkmont and would emphasize the integration of cultural and natural resource themes.

2.4.6 Facilities Development with Detailed Site Plans for Alternative A

Changes to facilities that would occur with Alternative A are summarized in Table 2-4. Additional details regarding this alternative are provided in Tables 2-15 through 2-21 at the end of this chapter.

All of the buildings and structures within the Elkmont Historic District that are associated with the Appalachian and Wonderland Clubs would be removed either by mechanical means or by hand removal. Foundations and buried features would not be excavated, but would be removed if this action would not cause additional ground disturbance. Minimal grading may be performed to blend former building sites into existing topography

Former building sites would be restored with native plant species collected or propagated by the National Park Service from within the District. Restoration of native plant communities would provide soil stabilization and reduce soil erosion that currently causes sediment deposition in surrounding water bodies, floodplains, wetlands, and other sensitive natural areas.

2.0 ALTERNATIVES

Table 2-4: Summary of Implementation Elements for Alternative A

Element	Action
Use of contributing structures	None; remove all contributing structures.
Measures for buildings retained	None; remove all contributing structures.
Natural resources management	Actively manage for the reestablishment of native plant communities throughout the District. Manage to develop the globally imperiled montane alluvial forest plant community in areas with suitable conditions. Eradicate non-native species. Continue current management activities, including non-native species management, hemlock management, water quality monitoring, and fish population assessment.
Visitor use	Maintain current visitation levels and activities, such as camping, fishing, hiking, and other compatible recreation.
Interpretive features	Install one wayside exhibit describing history of the town of Elkmont, and one wayside exhibit on synchronous fireflies. Revise the Elkmont Nature Trail brochure to include a description of the District's cultural and natural resources.
Access / circulation	No changes to existing access or circulation.
Parking	No parking improvements or changes.
Utilities	No changes to existing utilities.
Landscape treatment	Remove aboveground features, including foundations and rock walls. Retain other cultural landscape features where they do not pose a safety hazard.
Park operations and staffing	Eliminate stabilization requirements contributing structures by removing the structures. Provide a plant management specialist on a half-time basis during the growing season months to remove non-native species, collect native seed, and transplant native plants. Continue the current level of maintenance for existing infrastructure.

As part of this alternative, the footings of a small footbridge over Bearwallow Branch would be repaired. The bridge surface would be restored to improve safety for hikers.

No infrastructure improvements would be needed for Alternative A. However, the use of heavy equipment to remove buildings may accelerate the deterioration of existing roads within the District. Mitigation for effects on roads is included in Section 2.10. Road repair work would not occur until building removal was completed. Once necessary repairs were made, no additional operation and maintenance expenditures would be needed for roads beyond those funds presently budgeted for roads within the District.

2.4.7 Estimated Development Costs

The estimated total one-time capital cost for implementation of Alternative A is \$1,563,226. The estimated annual operating costs for implementation of Alternative A are \$60,481. All estimates are in 2010 dollars. An itemized list of costs and post-construction operation and maintenance costs is provided in Appendix C. Total costs of Alternative A are based on funds necessary to perform:

- building removal
- infrastructure improvements, including existing road repairs
- vegetation management, non-native species removal, and native plant community restoration
- resource education components
- mitigation measures to be implemented as part of the alternative

2.5 ALTERNATIVE B

2.5.1 Concept

Alternative B would retain some of the contributing structures in the Elkmont Historic District and would provide for restoration of native plant communities in locations where buildings were removed. The buildings proposed for restoration and preservation were selected to provide a contiguous representative collection of contributing structures and the associated cultural landscape during the period of significance in one area of the District.

Alternative B would include the installation of exhibits on the history of Elkmont and on synchronous fireflies. The Elkmont Nature Trail brochure would be updated. In addition, Alternative B would include interpretive features throughout the District that would focus on the natural and cultural resources of the Elkmont Historic District (see Table 2-16). The focus of visitor education would be interpretation of the changing landscape, the development of Elkmont, and the travel and tourism that eventually led to establishment of the Park.

Table 2-5 summarizes the proposed treatment for all buildings under Alternative B. The site plan for the alternative is depicted on Figure 2-4.

Table 2-5: Buildings Summary for Alternative B

Area/Buildings	Status	Uses
Wonderland Club		
Wonderland Hotel	Remove	Restoration of native plant communities; wayside exhibits and exhibits at orientation kiosk
Annex	Remove	Restoration of native plant communities
Cabins	Remove all	Restoration of native plant communities
Millionaire's Row	Remove all	Restoration of native plant communities; wayside exhibit
Daisy Town		
Appalachian Clubhouse	Restore exterior, rehabilitate interior	Public rental and day use; walking tour with interior self-guiding museum exhibits and wayside exhibits
Cabins	Restore 11 of the contributing cabins and return one non-contributing building to their historical configuration and preserve interiors, remove all others	Walking tour with wayside exhibits; restoration of native plant communities where buildings are removed
Society Hill	Remove all	Restoration of native plant communities

2.5.2 Land Protection

Alternative B would provide land protection by being consistent with the Park's mission to preserve cultural and natural resources. Although some of the contributing structures would be removed, Alternative B would retain a grouping of buildings for cultural resource interpretation purposes. These features would remain as a link to the past human occupation of the Appalachian

2.0 ALTERNATIVES

and Wonderlands Clubs. Natural resources would be protected by restoring native plant species at all of the former building sites except where a parking lot would be installed.

2.5.3 Cultural Resource Management

Alternative B would provide for cultural resource management consistent with the Park's mission by retaining and restoring a small grouping of contributing structures. These buildings, which include the Appalachian Clubhouse and 12 cabins, were selected as a representation of a contiguous cultural landscape in the Daisy Town part of the District. In the remainder of the District where buildings were removed, stone walls and foundations would be left in place for interpretive purposes.

The gravel walking path extending from the Appalachian Clubhouse to Jakes Creek Cemetery would be restored. This path was originally developed as a boardwalk, but was later replaced with compacted gravel during the period of significance. Currently, although the historic location of this pathway remains visible, it is not actively maintained. Gravel would be placed over the existing path, extending from the Appalachian Clubhouse south to the road to Jakes Creek Cemetery. This path would provide for separation of pedestrian and vehicular traffic.

Alternative B would protect and perpetuate cultural resources through preservation and restoration of a representative collection of buildings and the associated cultural landscape in one area of the District. Stonework and foundations would be retained at some sites where buildings were removed. Appendix C provides measures to avoid potential impacts to shallow archeological deposits and recommendations for specific buildings or groups of buildings.

2.5.4 Natural Resource Management

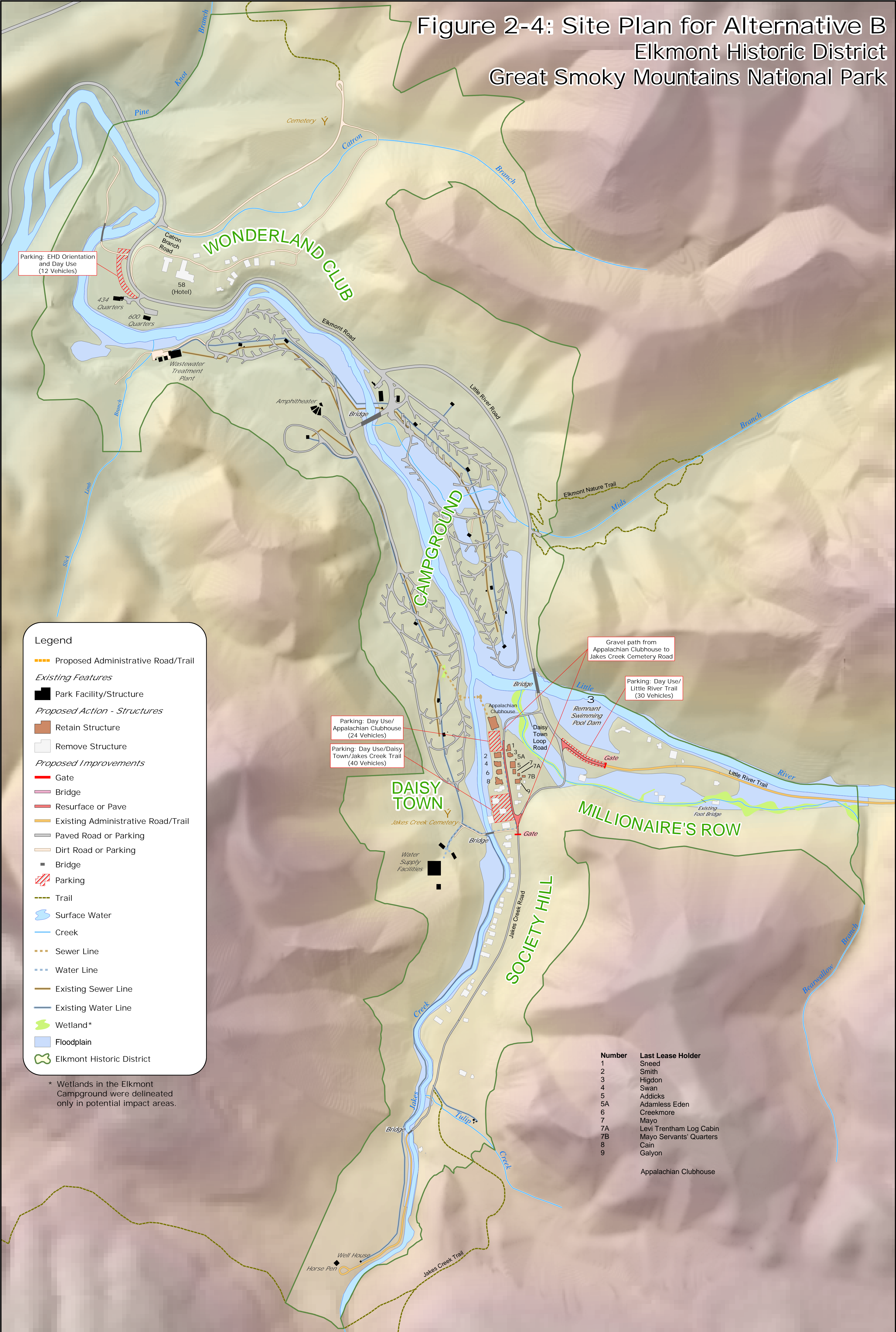
Past use of the Elkmont area for farming and for private and commercial logging operations substantially disturbed plant communities within the District. Subsequent construction within the District and activities such as planting ornamental species, rerouting Bearwallow Branch, driving and parking off paved roads, and deposition of refuse and other materials caused additional disturbance.

Alternative B would protect and perpetuate natural resources and ecosystems. This would include restoring native plant communities in all areas from which buildings were removed with plants propagated from native seed sources and salvaged plants collected within the District. Native plant materials also would be used to create a visual barrier between the parking area and Quarters 434 and 600. Active restoration of native plant communities would increase species diversity, improve and increase wildlife habitat, and provide soil stabilization. Although some buildings would be retained under this alternative, the majority would be removed, allowing for reestablishment of plant communities across much of the site.

Natural resource management practices would continue at their current levels. These include removal of non-native species, treatment of hemlock woolly adelgid infestations, and monitoring

This alternative would not generate discharge above the permitted allowance from the sewage treatment plant or nonpoint runoff into the Little River or its tributaries. No additional structures

Figure 2-4: Site Plan for Alternative B
Elkmont Historic District
Great Smoky Mountains National Park



or activities within the 100-year floodplain are proposed. Visitor use would continue at existing levels. Defined and delineated parking for day use visitors and for trailheads would prevent and minimize uncontrolled site impacts by providing adequate space for vehicles in designated parking areas.

2.5.5 Interpretation and Visitor Use

According to the *General Management Plan*, the objective of the interpretive effort is to demonstrate to visitors the value of the Park as a sanctuary from some of the effects of the modern, technological world and to show how the special qualities of such a sanctuary relate to and benefit people.

Under this alternative, interpretive features, such as wayside exhibits or other resource education components, would be included to facilitate an understanding of the history of the District from cultural and natural resource viewpoints (see Table 2-16). Opportunities for interpretation of plant communities, including natural succession and forest recovery, would be provided. Visitors would learn about Elkmont's human occupation through interpretive exhibits, retention of cultural landscape features, and restoration and rehabilitation of the Appalachian Clubhouse and cabins in Daisy Town.

The interior of the clubhouse would be rehabilitated to allow for day use activities. In addition, interior exhibits would be installed in the clubhouse, which would serve as a self-guiding museum for visitors using this facility. Wayside exhibits would be installed outdoors, adjacent to the clubhouse.

2.5.6 Facilities Development with Detailed Site Plans for Alternative B

Table 2-6 summarizes actions that would be taken within the Elkmont Historic District to implement Alternative B. Additional details regarding this alternative are provided in Tables 2-15 through 2-21 at the end of this chapter.

Under Alternative B, 12 cabins would be restored on the exterior and preserved on the interior. The Appalachian Clubhouse would be restored on the exterior and rehabilitated on the interior to serve as a public day use, rental facility and as a self-guiding museum. All of the remaining contributing structures would be removed either by mechanical means or by hand removal. Foundations and buried features would not be excavated.

Following building removal, former building sites would be restored with native plant species from seed and other plant materials collected from within the District. Restoration of native plant communities would stabilize the soil and reduce soil erosion and the associated sedimentation into surrounding water bodies, floodplains, wetlands, and other sensitive natural areas.

Specific project implementation requirements for Alternative B are described below.

2.0 ALTERNATIVES

Table 2-6: Summary of Implementation Elements for Alternative B

Element	Action
Use of contributing structures	Retain 12 cabins and the Appalachian Club, and remove remainder.
Measures for buildings retained	Restore exteriors in accordance with <i>The Secretary of the Interior's Standards for the Treatment of Historic Properties</i> (The Secretary of the Interior 2005). Preserve interiors of cabins. Restore the exterior of Appalachian Clubhouse and rehabilitate the interior to allow for public rental and day use.
Natural resources management	Continue current management activities, including hemlock pest control, water quality monitoring, and fish population assessment. Revegetate former building sites.
Visitor use	Maintain current visitation levels and activities, such as camping, fishing, hiking, and other compatible recreation. Provide interpretation of the retained Daisy Town cabin community. Use building rental and self-guiding museum in the Appalachian Clubhouse for an experience currently not available at the District.
Interpretive features	Provide orientation kiosk and brochure across from former hotel site on Elkmont Road. Revise the Elkmont Nature Trail brochure to include natural resource information. Install eight wayside exhibits. Use interior exhibits in the Appalachian Clubhouse as a self-guiding museum.
Access / circulation	<ul style="list-style-type: none"> • Relocate gate on Little River Road to east end of Little River trailhead parking area. • Relocate existing gate or install new gate at the beginning of Jakes Creek Road. • Place gravel over existing path in Daisy Town from Appalachian Clubhouse to road to Jakes Creek Cemetery. • Pave Little River trailhead: 350 linear feet. • Pave Daisy Town loop : 1,111 linear feet. • Pave orientation parking area road: 400 linear feet. • Install walking path from orientation parking area.
Parking	Construct four parking areas with 106 spaces.
Utilities	<p>Add public restroom available from both outside and inside for day users of the Appalachian Clubhouse.</p> <p>Install sprinkler system in Appalachian Clubhouse for fire suppression.</p> <p>Install:</p> <ul style="list-style-type: none"> • Water line: 1,300 linear feet to Appalachian Clubhouse. • Wastewater system: 640 linear feet of gravity sewer line from Appalachian Clubhouse.
Landscape treatment	Retain foundations, rock walls, and other cultural features where they do not pose a safety hazard to visitors.
Park operations and staffing	<p>Reduce stabilization requirements by removing all but 12 cabins and the Appalachian Clubhouse.</p> <p>Increase operation and maintenance requirements to maintain the infrastructure and the buildings retained and to process special use permits.</p>

2.5.6.1 Water

Visitors use Little River Road to access the District, trails leading from the Elkmont area, and the 220-site Elkmont Campground. Under Alternative B, day users and other visitors will have access to new facilities, but visitation would not increase substantially.

Additional water would be required to accommodate use of the restroom that would be provided at the Appalachian Clubhouse. As shown in Table 2-18, 500 uses per day by visitors would result in increased water demand of 1,625 gallons per day.

To meet state building codes, the fire suppression system in the Appalachian Clubhouse would have two sprinkler heads in the food preparation area. As described in Section 2.2.5, the total capacity required by the fire suppression system would be 975 gallons over a 30-minute period.

To meet these needs, a new water supply pipeline would be constructed from the existing Jakes Creek Cemetery water storage tanks to the Appalachian Clubhouse (see Table 2-19).

2.5.6.2 Wastewater

Sewer service would be required to accommodate the restroom facilities and day use in the Appalachian Clubhouse. Wastewater generation was calculated at 1,300 gallons per day (see Table 2-18). The required improvements would include a gravity sewer line from the Appalachian Clubhouse to the existing manhole in Elkmont Campground and would include a crossing under Jakes Creek (see Table 2-20).

2.5.6.3 Roads and Paths

Road improvements would facilitate safe vehicular and pedestrian access to exhibits and trailheads within the District. Details regarding road improvements for Alternative B are included in Table 2-21. Information regarding these features is provided below.

The average day use visitation to the District is estimated at 500 visitors per day under Alternative B. With an average of 2.8 visitors per car, approximately 180 cars per day would visit the District. The majority of these visits would be short-term, and the visits would generally be spaced uniformly throughout the day. Therefore, for an eight-hour day, projected traffic counts would be approximately 20 to 25 cars per hour. To provide access to the restored cabins and exhibits proposed under this alternative, road repairs and resurfacing of Daisy Town Loop Road would be required. Increased vehicular traffic in Daisy Town could result in conflicts between pedestrian and vehicular traffic, creating a need to better control traffic patterns.

The proposed restoration of a group of buildings at Daisy Town and installation of exhibits throughout the District would not cause an increase in visitation. However, the internal circulation of visitors would increase as visitors accessed new exhibits and other features. Therefore, road and walkway improvements would be required to facilitate safe viewing of the exhibits.

Traffic and the lack of adequate parking would result in the need for improvements to the existing road system in the Millionaire's Row/Little River Trailhead area, in particular, visitor parking from Daisy Town that may overflow into the Little River parking area. The Alternative B improvements would facilitate vehicle movement in the area, expand the capacity of the road close to the Little River Trailhead, and improve access to the proposed exhibits and walking tour. Other road improvements are needed in the Wonderland Club area where an orientation kiosk and related exhibits would be installed.

In several areas of the District where existing roads cross small waterways flowing through storm drain culverts, erosion of the road and culvert embankments has occurred. To protect the roads and prevent further erosion, the stream banks would be stabilized. The culverts include Tulip Creek at Jakes Creek Road, Bearwallow Branch at Jakes Creek Road and Daisy Town Loop Road, Mids Branch at Little River Road, and Catron Branch at Elkmont Road.

2.0 ALTERNATIVES

The existing stone steps in front of the Wonderland Hotel are irregular in shape and spacing, making them hazardous to use. For the safety of visitors, the steps may be closed to the public with a restrictive barrier that is capable of preventing pedestrians from climbing the stairs. In that event, a 400-foot-long walking path in the vicinity of the historic walkway on the west side of the steps would be constructed from the base of the Wonderland steps to the top of the Wonderland steps.

To provide access for parking at the Little River Trailhead, a gate would be relocated from its current location on Little River Road to the east end of the Little River Trailhead parking area. A walking path from the parking area at the Little River Trailhead to the exhibits would be constructed. A gate on Jakes Creek Road would be relocated from its existing location near the bridge over Jakes Creek to just south of Jakes Creek Cemetery Road.

2.5.6.4 Parking and Access

As identified in Table 2-17, Alternative B would include 106 new parking spaces. Although average daily visitation is not expected to increase under this alternative, the number of internal trips within the District to visit exhibits and other features would require additional parking. More parking also would facilitate pedestrian access to destinations, including the Wonderland Club orientation kiosk; Millionaire's Row/Elkmont Nature Trail and the Daisy Town cabins and exhibits; and day use exhibits and self-guiding museum at the Appalachian Clubhouse.

Current estimates place approximately 30 vehicles per hour at both the Little River and Jakes Creek trailheads (NPS 2002a). An additional parking lot at the Appalachian Clubhouse would accommodate day use vehicles. The existing parking area adjacent to the Clubhouse has space for up to 24 vehicles, and would be dedicated to day use functions under special use permit. Although day use of the Appalachian Clubhouse most likely would not occur every day, the proposed parking for the entire District must be sufficient to accommodate the maximum projected number of vehicles that will be in the District at any given time.

In addition to paving the Appalachian Clubhouse parking area, the need for 82 parking spaces (30 at each trailhead plus 22 day use visitors) would be met by construction of the District orientation parking area across the road from the former Wonderland Hotel (12 spaces), construction of "pull in" parking at the Little River Trailhead at Millionaire's Row (30 spaces), and construction of Daisy Town/Jakes Creek Trailhead parking in a location where non-contributing buildings would be removed (40 spaces). The latter parking area would serve hikers using Jakes Creek Trail and visitors who would like to walk through Daisy Town to see the restored buildings, new exhibits, and cemetery.

Parking would be more concentrated in designated areas than the existing situation, in which parking is dispersed throughout the District. The parking lots would be paved with pervious pavement to reduce the quantity of runoff from the paved area while eliminating the potential for rutting and soil erosion.

2.5.6.5 Other Requirements

Several actions associated with Alternative B would address safety or aesthetics:

- The entrance to the orientation kiosk and parking area is near a curve in the road, which limits site distance. As a safety measure, signs would be installed on Elkmont Road to alert drivers to the upcoming entrance to the parking area.
- A visual screen for all proposed parking areas would be created using plant materials relocated from other areas in the District. The vegetative screening would reduce the visual intrusion of the parking areas into the cultural landscape.
- The footings of a small footbridge over Bearwallow Branch would be repaired and the surface would be restored. These actions would improve pedestrian safety.
- Alternative B may result in damage to the existing roads from heavy machinery traffic during project implementation. The roads that may require repairs are described in Section 2.10.

2.5.7 Estimated Development Costs

The estimated total one-time capital cost for implementation of Alternative B is about \$5,074,996. The estimated annual operating costs for implementation of Alternative B are \$142,886. All estimates are in 2010 dollars. An itemized list of costs and post-construction operation and maintenance costs is provided in Appendix C. Total costs of Alternative B are based on funds necessary to perform:

- building removal, restoration, rehabilitation, and preservation
- infrastructure improvements, including
 - parking lots (improvements and new lots)
 - road system improvements
 - water supply system improvements
 - wastewater system improvements
- vegetation management
- resource education components
- mitigation measures to be implemented as part of the alternative
- resource and visitor protection patrols

2.6 ALTERNATIVE C, THE ENVIRONMENTALLY PREFERRED AND AGENCY PREFERRED ALTERNATIVE

2.6.1 Concept

This alternative would allow for cultural resource preservation through exterior restoration of most of the buildings in Daisy Town and the Chapman cabin in Society Hill. The Spence cabin in Millionaire's Row and the Appalachian Clubhouse would also be rehabilitated for visitor day use. As in Alternative A, exhibits would be provided about the history of the town of Elkmont and natural history of synchronous fireflies. The Elkmont Nature Trail brochure would be updated to include a description of the montane alluvial forest and other important natural resources of the District. Alternative C also would include other interpretive features, described in Table 2-16, in the Wonderland Club, in Daisy Town and at the Appalachian Clubhouse.

The visitor education focus would be interpretation of the changing landscape, development of Elkmont, and travel and tourism that eventually led to establishment of the Park. Restored buildings would provide a sense of community and spatial relationships in sections of the District. Natural regeneration of forested areas would take place in the remaining areas of the District, including the floodplain along the Little River, where the montane alluvial forest habitat exists.

Table 2-7 provides a summary of the proposed treatment for all buildings under Alternative C. The site plan for this alternative is depicted on Figure 2-5.

Table 2-7: Buildings Summary for Alternative C

Area/Buildings	Status	Uses
Wonderland Club		
Wonderland Hotel	Remove	Wayside exhibit at former hotel site; kiosk on west side of Elkmont Road with self-guiding brochure
Annex	Remove	Restoration of native plant communities
Cabins	Remove all	Restoration of native plant communities
Millionaire's Row	Remove all except the Spence cabin	Restoration of native plant communities; wayside exhibit; visitor day use of Spence cabin
Daisy Town		
Appalachian Clubhouse	Restore exterior, rehabilitate interior for day use	Public rental and day use; walking tour with interior self-guiding museum exhibits and wayside exhibits
Cabins	Restore exteriors of all 15 contributing cabins and return one non-contributing building to its historical configuration; preserve interiors	Walking tour with wayside exhibits; restoration of native plant communities where buildings are removed
Society Hill	Restore exterior of Chapman cabin, remove all others	Exhibit and walking tour Restoration of native plant communities

2.0 ALTERNATIVES

Alternative C would retain the buildings in Daisy Town, the Chapman cabin on Society Hill, and the Spence cabin in Millionaire's Row for use in cultural resource interpretation. The interpretive cluster at the Appalachian Club would include the Clubhouse building plus 16 clustered cabins that form a distinct cultural landscape. Forest restoration and regeneration would occur where cabins were removed. These areas would then be managed for protection of natural resources.

In conformance with the requirements of the National Environmental Policy Act, Alternative C has been identified as the environmentally preferred alternative. It achieved this designation because it retains buildings, structures, and component landscapes in clusters and associations sufficient to provide a sense of character in a core area of the District while allowing for natural regeneration of native plant communities in remaining areas where buildings would be removed. In addition, this alternative would provide multiple opportunities for natural and cultural resource interpretation throughout all areas of the District.

2.6.2 Land Protection

Alternative C would provide land protection by being consistent with the Park's mission to preserve cultural and natural resources. Although some of the contributing structures would be removed, Alternative C would retain a grouping of buildings and components of the cultural landscape for interpretation purposes. These features would remain as a link to the past human occupation of the District. Natural resources would be protected by allowing for natural revegetation of all of the former building sites except where a parking lot would be installed.

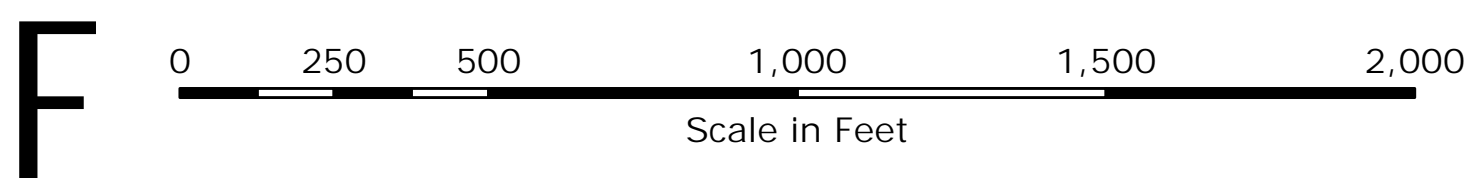
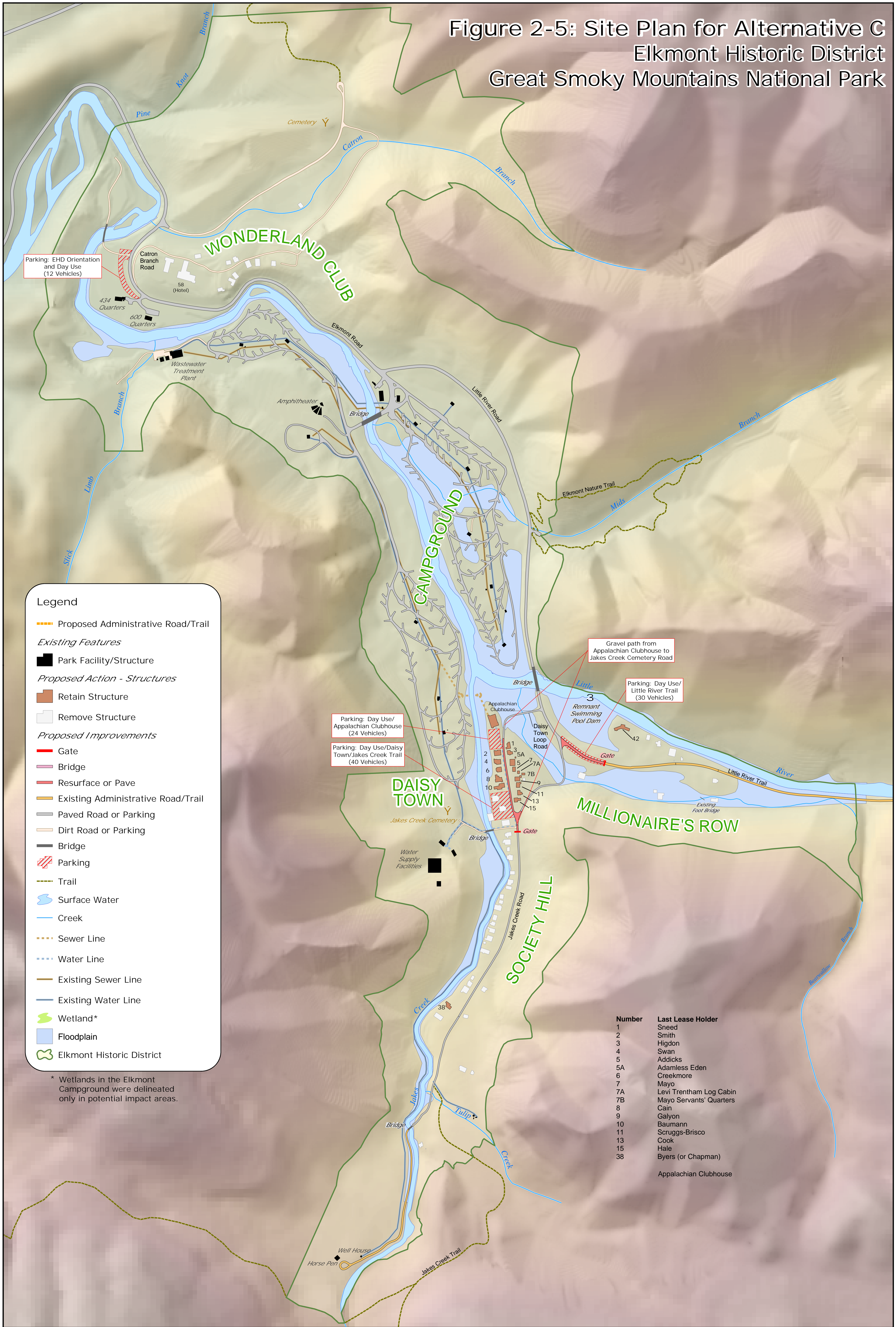
2.6.3 Cultural Resource Management

Alternative C would provide for cultural resource management by preserving the core of the resort community at the Appalachian Club (Daisy Town) and the majority of Elkmont's cultural landscape features. It also would provide a variety of opportunities for interpretation of Elkmont's cultural resources. Where buildings were removed, stone walls and foundations would be left in place. This alternative would also incorporate interpretive wayside exhibits that focused on Elkmont's human and natural story, including the logging history of the area and the construction of the railroad that led to the establishment of the town of Elkmont.

Alternative C would preserve the Daisy Town portion of the Appalachian Club. Daisy Town is the oldest vacation area of Elkmont and began the club-town boom there. The proximity of the Daisy Town cabins to the clubhouse building and the presence of landscape elements such as stone walls and walkways would provide the best opportunity to demonstrate to visitors how this resort community evolved and functioned. Alternative C also would retain the historic swimming hole at Little River and most of the landscape elements, such as walls and other small-scale features, throughout the Elkmont community.

The front porches and the close setbacks of most cabins to the road and walkway in Daisy Town create a visual order that strongly suggests the community structure in this portion of Elkmont. The density of buildings and continuous streetscape characteristics, such as border walls and pathways, are complete in Daisy Town in contrast to other areas of Elkmont where the streetscape and building lines are broken, incomplete, or entirely absent. Because Daisy Town evokes a strong sense of community, this area of Elkmont offers the best opportunity for visitors to understand the

Figure 2-5: Site Plan for Alternative C
Elkmont Historic District
Great Smoky Mountains National Park



former vacation community and the broad cultural pattern of second-home vacation cabins in the southern Appalachians during the early 20th century. Daisy Town also preserves a representative cross-section of the various construction techniques and building materials present in the Elkmont Historic District, including the only “set-off” cabins in the Park. Set-off cabins were a type of prefabricated housing employing modules that could be loaded on a flatcar. The modules were off-loaded at Elkmont and assembled into houses.

This alternative includes the preservation and interpretation of the Chapman cabin (#38) in Society Hill. The building is associated with Colonel David Chapman who was influential in the establishment of Great Smoky Mountains National Park. The Spence cabin (#42) in Millionaire’s Row would be rehabilitated for visitor day use.

The gravel walking path extending from the Appalachian Clubhouse to Jakes Creek Cemetery would be restored. This path was originally developed as a boardwalk, but was later replaced with compacted gravel during the period of significance. Although the historic location of this pathway remains visible, it is not actively maintained. This path would continue to provide separation of pedestrian and vehicular traffic.

Alternative C would protect and preserve Elkmont’s cultural resources through the retention and interpretation of a representative collection of buildings and the associated cultural landscape in a core area of the District. This alternative would retain the maximum number of Elkmont’s cultural landscape features, such as stonework and foundations where buildings were removed. Combined with interpretive media, especially wayside exhibits, Alternative C would allow visitors to gain an understanding of the scope of the Elkmont vacation community and how it functioned in its heyday.

Appendix C provides measures to avoid potential impacts to shallow archeological deposits and recommendations for specific buildings or groups of buildings, and other areas where modifications are proposed.

2.6.4 Natural Resource Management

Although some buildings would be retained under this alternative, the majority would be removed, and their sites would be used for reestablishment of plant communities. Alternative C would include planting native plant communities with vegetation propagated from native seed sources and salvaged plants collected from within the District. Native plant materials also would be used to create visual buffers between the parking areas and Quarters 434 and 600. Active restoration of native plant communities would increase species diversity, improve and increase wildlife habitat, and provide soil stabilization. Other natural resource management practices, including removal of non-native species, treatment of hemlock woolly adelgid infestations, and monitoring activities, would continue at their current level.

Alternative C would not generate discharge above the permitted allowance from the sewage treatment plant or nonpoint runoff into the Little River or its tributaries. No additional structures or activities within the 100-year floodplain are proposed. A low level of visitor use would occur. Defined and delineated parking for day use visitors and for trailheads would prevent and minimize uncontrolled site impacts by providing adequate space for vehicles in designated parking areas.

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2.6.5 Interpretation and Visitor Use

As shown in Table 2-16, Alternative C would include interpretive features, such as buildings, cultural landscape components, exhibits, and other resource education components. This alternative would include displays and brochures that focused on cultural history, natural history, architecture, the logging history of the area, construction of the railroad, and establishment of the town of Elkmont. A wayside exhibit would provide a historical perspective on Colonel Chapman's role in establishing Great Smoky Mountains National Park.

Alternative C would restore a representative collection of buildings in one area of the District to provide a sense of its character and community. Retaining some landscape features such as stonework and foundations would provide opportunities for interpretation of sites where buildings had been removed.

The Appalachian Clubhouse would be used as a self-guiding museum and for public rental and day use. The Spence cabin would be also be used for public day use. The Chapman cabin would be restored on the exterior and preserved on the interior to aid in telling the story of the Park's establishment. In areas where buildings are removed, educational opportunities related to the natural regeneration of native plant communities would be provided.

2.6.6 Facilities Development with Detailed Site Plans for Alternative C

Table 2-8 summarizes actions that would be taken within the Elkmont Historic District to implement Alternative C. Additional details regarding this alternative are provided in Tables 2-15 through 2-21 at the end of this chapter.

Under Alternative C, 19 buildings, consisting of 16 cabins/buildings in Daisy Town, the Chapman cabin, the Spence cabin and the Appalachian Clubhouse, would be restored on the exterior. The cabins in Daisy Town and the Chapman cabin would be preserved on the interior. The Appalachian Clubhouse would be rehabilitated on the interior and exhibits would be installed. The Clubhouse would serve as a self-guiding museum and would also be available for reserved day use through special use permit. The interior of the Spence cabin would also be rehabilitated for public day use.

All of the remaining contributing structures would be removed. Removal would be accomplished either by mechanical means or by hand removal. Foundations and buried features would not be excavated.

Following removal, former building sites would be restored with native plant species from the District. Restoration would stabilize the soil and reduce soil erosion and the associated sedimentation into surrounding water bodies, floodplains, wetlands, and other sensitive natural areas.

Alternative C would include all of the infrastructure requirements for roads, water supply, wastewater treatment, and parking and access that described for Alternative B. In addition, a portion of Jakes Creek Road would be repaired to provide a stable walking surface.

Table 2-8: Summary of Implementation Elements for Alternative C

Element	Action
Use of historic structures	Retain 16 buildings in Daisy Town (15 contributing, 1 non-contributing), the Appalachian Clubhouse, the Chapman cabin in Society Hill, and the Spence cabin in Millionaire's Row; remove the Wonderland Hotel and remainder of contributing structures.
Measures for buildings retained	Conduct all work in accordance with <i>The Secretary of the Interior's Standards for the Treatment of Historic Properties</i> (The Secretary of the Interior 2005). Restore exteriors and preserve interiors of cabins. Restore exterior of Appalachian Clubhouse and rehabilitate interior to provide for public rental and day use.
Natural resources management	Continue current management activities including hemlock pest control, water quality monitoring, and fish population assessment. Revegetate former building sites.
Visitor use	Maintain current visitation activities, such as camping, fishing, hiking, and other compatible recreation. Establish a walking tour to view exhibits and restored buildings. Permit day use of the Appalachian Club. Visitation is not expected to increase substantially.
Interpretive features	Install up to 10 interpretive exhibits throughout the District focusing on natural and cultural resources, history of Elkmont, and history of Park establishment and the role of Colonel Chapman. Revise Elkmont Nature Trail brochure to discuss important natural resources. Place kiosk in the orientation area with introduction and history of District. Install interior exhibits in Appalachian Clubhouse to serve as self-guiding museum.
Access / circulation	<ul style="list-style-type: none"> Relocate gate on Little River Road to east end of Little River Trailhead parking area. Relocate existing gate or install new gate at the beginning of Jakes Creek Road. Resurface gravel walking path in Daisy Town from Appalachian Clubhouse to road to Jakes Creek Cemetery. Pave Little River trailhead: 350 linear feet. Pave Daisy Town loop: 1,111 linear feet. Pave orientation parking area road: 400 linear feet. Construct walking path from orientation parking lot along Elkmont Road to base of Wonderland steps: 550 linear feet. Construct path on west side of Wonderland steps to the top of the steps: 400 linear feet.
Parking	Construct four parking areas. Add public restroom to the day use area of the Appalachian Club. Install sprinkler system in Appalachian Clubhouse for fire suppression.
Utilities	Install: <ul style="list-style-type: none"> Water line: 1,300 linear feet to Appalachian Clubhouse. Wastewater system: 640 linear feet of gravity sewer line from Appalachian Clubhouse.
Landscape treatment	Retain foundations, rock walls, and other cultural features where they do not pose a safety hazard to visitors. Reduce stabilization requirements by removing all but 17 cabins and the Appalachian Clubhouse.
Park operations and staffing	Increase operation and maintenance requirements to maintain the infrastructure and the buildings retained and to process special use permits. Continue general maintenance to existing infrastructure.

As described in Alternative B, the existing stairway to the Wonderland Hotel is in disrepair and does not meet current building codes. As a safety measure, a barrier would be installed to prevent pedestrian access to the steps, and a path up the hill would be constructed to provide access to the exhibits at the former hotel site. As shown in Table 2-16, Alternative C also includes additional wayside exhibits at the Wonderland Hotel site and at the Chapman cabin in Society Hill.

2.0 ALTERNATIVES

Increased internal vehicle traffic would result in the need for an incremental increase in the operations and maintenance budget for the roads affected by this alternative. These roads include Elkmont Road, Little River Road, Jakes Creek Road, and Daisy Town Loop Road and their associated parking areas.

2.6.7 Estimated Development Costs

The estimated total one-time capital cost for implementation of Alternative C is \$6,236,791. The estimated annual operating costs for implementation of Alternative C are \$147,295. All estimates are in 2010 dollars. An itemized list of costs and post-construction operation and maintenance costs is provided in Appendix C. The approval of this GMP Amendment does not guarantee that funding or staffing needed to implement the plan will be forthcoming. Full implementation of this plan could be many years into the future and is dependent on funding, NPS servicewide priorities, partnership funds, time and effort. Total costs of Alternative C are based on funds necessary to perform:

- building removal, rehabilitation, restoration, and preservation
- infrastructure improvements, including
 - parking lots (improvements and new lots)
 - road system improvements
 - water system improvements
 - wastewater system improvements
- vegetation management
- resource education components
- mitigation measures to be implemented as part of the alternative
- resource and visitor protection patrols

2.7 ALTERNATIVE D

2.7.1 Concept

Alternative D would address Park administrative needs by providing curatorial storage and supplying temporary housing for visiting scientists in part of the District. This alternative also would expand educational and day use opportunities. Alternative D would include restoration of 16 cabins or buildings 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 the Appalachian Clubhouse. Where buildings were removed, stone walls and foundations would be left in place for interpretive purposes.

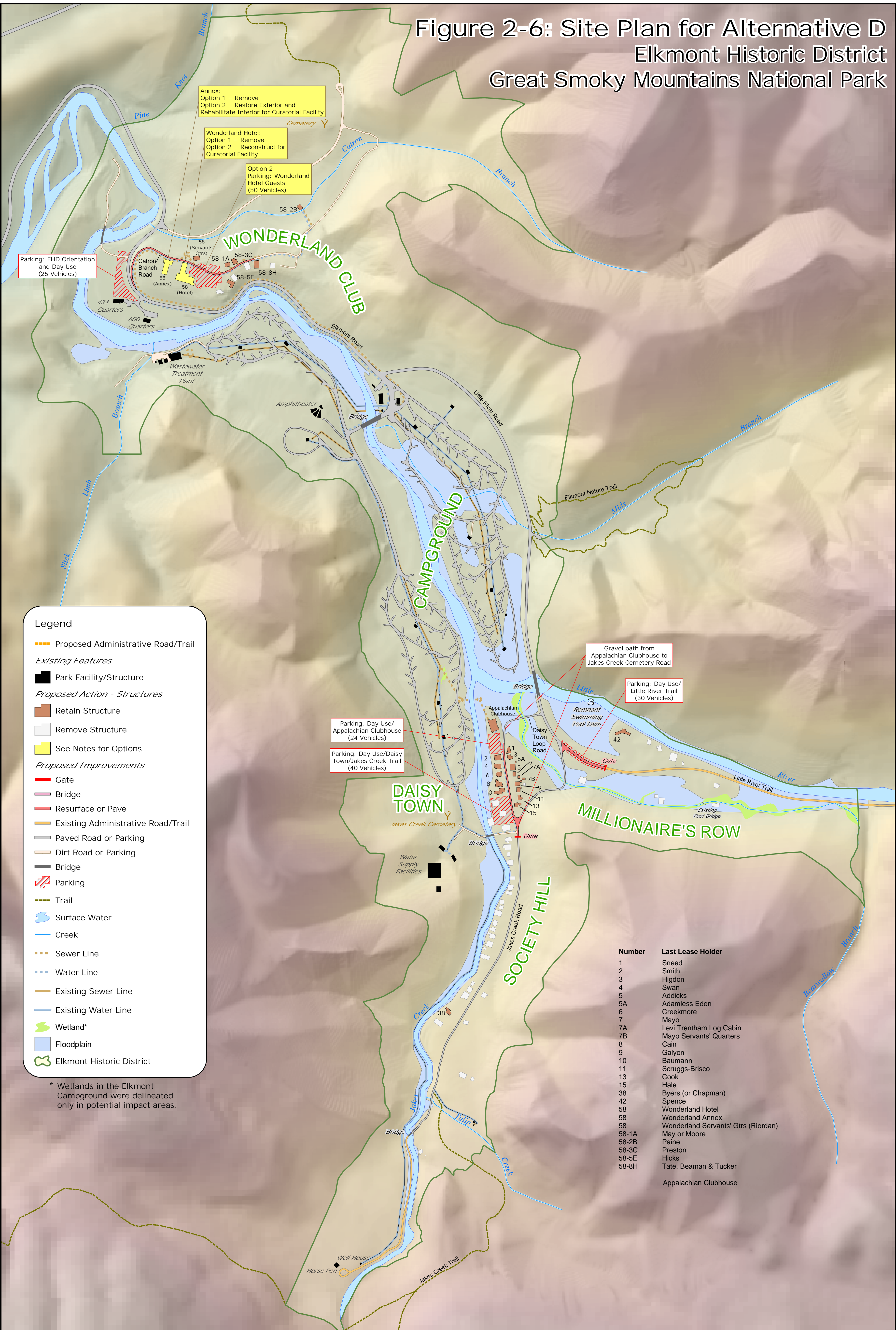
Two options for the Wonderland Hotel and Annex are proposed for this alternative. Alternative D1 would include the removal of both buildings. Alternative D2 calls for reconstruction of the hotel and rehabilitation of the annex for the National Park Service to use as curatorial storage. All of the remaining contributing structures would be removed and forest restoration would occur at the former building sites. Resource education opportunities focused on cultural and natural history would be provided at the Appalachian Clubhouse for the visiting public.

Table 2-9 summarizes the proposed treatment for all buildings under Alternative D. The site plan for the alternative is depicted on Figure 2-6.

Table 2-9: Buildings Summary for Alternative D

Area/Buildings	Status	Uses
Wonderland Club		
Wonderland Hotel	D1: Remove D2: Reconstruct to 1928 footprint	D1: Wayside exhibits; restoration of native plant communities D2: Curatorial storage; wayside exhibits
Annex	D1: Remove D2: Restore exterior and rehabilitate interior	D1: Restoration of native plant communities D2: Curatorial storage
Cabins	Restore six contributing cabins	Visiting scientist housing
Millionaire's Row	Restore Spence cabin; remove all others	Wayside exhibits Restoration of native plant communities
Daisy Town		
Appalachian Clubhouse	Restore exterior, rehabilitate interior for day use	Public rental and day use; walking tour with interior self-guiding museum exhibits and wayside exhibits; NPS staff-led programs
Cabins	Restore all 15 contributing cabins and return one non-contributing building to its historical configuration	Wayside exhibits and walking tour
Society Hill	Restore exterior of Chapman cabin, remove all others	Wayside exhibit and walking tour Restoration of native plant communities

Figure 2-6: Site Plan for Alternative D
Elkmont Historic District
Great Smoky Mountains National Park



Alternative D would include exhibits that feature the history of the Town of Elkmont and the natural history of synchronous fireflies. The brochure for the Elkmont Nature Trail would be revised. Under Alternative D1, a wayside exhibit would be erected at the former site of the hotel. The focus of the exhibit would be on the history of the hotel and the tourism and travel that led to establishment of the national park and the conflicts that arose in the Elkmont community over the decision on whether to establish the area as a national park or national forest.

Alternative D2 would include reconstruction of the Wonderland Hotel and restoration and rehabilitation of the annex for curatorial purposes. Currently, much of the Park's archival material is stored offsite in facilities that do not meet standards for museum collections and artifact storage, and the Park has identified the need for curatorial space.

Under Alternative D2, two exhibit panels would be placed on the porch of the reconstructed hotel with information regarding the historic view of the hotel, a description of the scenic vista, social life at Elkmont, and the establishment of the Park. A seating area would be provided and some cultural landscape features, such as the fountain and stairs, would be retained. A path up the hill to the former hotel site would be constructed to provide access to the exhibits.

An orientation area containing a kiosk with an overview of the history and resources of the District and an adjacent parking area would be constructed across Elkmont Road, west of the Wonderland Hotel site. Reserved day use of the Appalachian Clubhouse under special use permit would be included in Alternative D, along with installation of interior exhibits to provide a self-guiding museum. A wayside exhibit would be installed at the Spence cabin (#42), describing Colonel Townsend's role in the development of Elkmont. A wayside exhibit would be provided at the Chapman cabin (#38) describing Chapman's role in establishing the Park.

Restored buildings would provide the sense of community and spatial relationships in most areas of the District. Native plant communities would be restored in disturbed areas. Natural restoration of forested areas would take place in the remaining areas of the District except where parking lots were installed.

2.7.2 Land Protection

Alternative D would provide land protection by being consistent with the Park's mission to preserve cultural and natural resources. Although most of the contributing structures in Society Hill and Millionaire's Row would be removed, Alternative D would retain a grouping of buildings for resource interpretation in Daisy Town and an additional grouping for visiting scientist housing in the Wonderland Club.

The proposed use of the reconstructed Wonderland Hotel and rehabilitated Annex under D2 would be consistent with NPS policies regarding protection and reuse of the contributing structures to meet needs identified by the Park. A curatorial facility in the District would allow the Park to make cultural collections available to the public and researchers, which is consistent with the resource education themes proposed under this alternative as well. Other cultural landscape features would remain as a link to the past human occupation of the District. Natural resources would be protected over a large portion of the District by restoring native plant communities at the former building sites.

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2.7.3 Cultural Resource Management

Alternative D provides for cultural resource management consistent with the Park's mission by restoring the exteriors of buildings in all areas of the District. In Daisy Town, 16 cabins and the Appalachian Clubhouse would be restored to their historical exterior appearance. The Appalachian Clubhouse would also be rehabilitated on the interior to allow for public rental and day use, and interior exhibits would provide the opportunity for visitors to use the Clubhouse as a self-guiding museum. A variety of structured interpretive programs are also included in D1 and D2.

An existing walking path, in the location of the boardwalk that was present in Daisy Town into the 1920s, would be resurfaced with gravel and would aid in separating pedestrian traffic from vehicular traffic. The path would extend from the Appalachian Clubhouse south to Jakes Creek Cemetery Road.

The Chapman cabin (#38) would be restored on the exterior and preserved on the interior, and would serve as an interpretive exhibit. In Millionaire's Row, the interior of the Spence cabin (#42) would be preserved, the exterior would be restored, and the cabin would be the focus of another wayside exhibit. A path would be provided to the Spence cabin to allow for a pedestrian walking tour of the area.

In the Wonderland area, six cabins would be restored on the exterior and rehabilitated on the interior for use as lodging for visiting scientists. Under Alternative D1, the Wonderland Hotel and Annex would be removed, while under Alternative D2, the Wonderland Hotel would be reconstructed and the annex would be restored on the exterior and rehabilitated on the interior for curatorial storage. All work would be done in accordance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (The Secretary of the Interior 2005).

Alternative D would protect and perpetuate cultural resources by preserving buildings and representative cultural landscapes throughout the District. This alternative also would provide opportunities to convey the history of several important figures in Elkmont's past. Some cultural landscape features such as stonework and foundations would be retained at the sites where buildings were removed. Appendix C provides measures to avoid potential impacts to shallow archeological deposits and recommendations for specific buildings or groups of buildings, and other areas where modifications are proposed.

2.7.4 Natural Resource Management

Alternative D would restore native plant communities with plants propagated from native seed sources and salvaged plants collected from within the District. Native plant materials also would be used to create visual barriers to screen parking areas and for soil stabilization.

The most intensive use of buildings in this alternative would occur in the Wonderland Club, where six cabins would be restored and rehabilitated as temporary housing for visiting scientists. Overnight use would be restricted to visiting scientists. The additional sewage that would be generated by overnight use and increased visitation would have to be treated to meet water quality standards. No additional structures or activities are proposed within the 100-year floodplain.

Alternative D2 would reconstruct the Wonderland Hotel and rehabilitate the annex for curatorial purposes. Disturbance of plant communities would occur to accommodate these uses. Natural

resource management practices for controlling non-native species, treating hemlock woolly adelgid infestations, and conducting monitoring would continue at their current level.

2.7.5 Interpretation and Visitor Use

Table 2-16 summarizes the education components that would be associated with Alternative D. The visitor education focus would be interpretation of the changing landscape, construction of the railroad and establishment of the Town of Elkmont, the logging history of the area, and the travel and tourism that led to establishment of the Park. Visitors would have an opportunity to participate in structured interpretive programs led by Park staff at the Appalachian Clubhouse from May through October.

In addition to the interpretive features included in Alternative A, a wayside exhibit would provide a historical perspective on Colonel Chapman's role in establishing the Park. The brochure currently available for interpretation at the Elkmont Nature Trail would be revised to include historical information about Elkmont and would emphasize the integration of cultural and natural resource themes.

An exhibit would be constructed at the Spence cabin (#42) that would include a historical perspective of Colonel Townsend's role in the development of Elkmont. Exhibits would be installed in a variety of locations in Daisy Town and adjacent to the Appalachian Clubhouse. Interior exhibits would be provided in the Clubhouse, which would serve as a self-guiding museum and day use facility. In conjunction with these interpretive features, Alternative D would include enhanced opportunities for seasonal natural and cultural resource education programs that would be offered to the public by Park staff.

Alternative D would provide visitors with opportunities to learn about Elkmont's human occupation while maintaining and restoring plant communities where buildings were removed. This alternative would maintain existing levels of traditional recreation, such as hiking, fishing, and camping. Alternative D would also restore and rehabilitate a variety of buildings to provide a sense of character of each of the District's built environments. Some cultural landscape features such as stonework and foundations would be retained to allow for interpretation at sites where buildings had been removed.

2.7.6 Facilities Development with Detailed Site Plans for Alternative D

Table 2-10 summarizes actions that would be taken within the Elkmont Historic District to implement Alternative D. Additional details regarding this alternative are provided in Tables 2-15 through 2-21 at the end of this chapter.

Under Alternative D, 16 cabins or buildings in Daisy Town, the Chapman cabin in Society Hill, the Spence cabin in Millionaire's Row, six cabins in the Wonderland Club, and the Appalachian Clubhouse would be restored on the exterior. Most would be preserved on the interior, and interpretive exhibits would be installed. The interior of the Appalachian Clubhouse would be rehabilitated to allow for public rental and day use with the display of interpretive exhibits. The interiors of the six cabins in the Wonderland Club would be rehabilitated, and the cabins would be used as temporary housing for visiting scientists.

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Table 2-10: Summary of Implementation Elements for Alternative D

Element	Action
Use of contributing structures	Retain 16 cabins / buildings in Daisy Town, the Chapman cabin in Society Hill, the Spence cabin in Millionaire's Row, six cabins in the Wonderland Club, and the Appalachian Clubhouse. Remove Wonderland Hotel and Annex under Alternative D1. Under Alternative D2, reconstruct the hotel and restore and rehabilitate the annex for curatorial purposes. Remove all other buildings.
Measures for buildings retained	Restore exteriors according to 1920s to 1930s appearance and preserve interiors of the Daisy Town, Spence, and Chapman cabins. Restore exterior of Appalachian Clubhouse and rehabilitate interior to provide for public rental and day use. Restore exterior and rehabilitate the interior of six cabins in Wonderland Club for visiting scientist housing. For Alternative D2, restore exterior of the annex and rehabilitate interior, and reconstruct and maintain the Wonderland Hotel. Perform all work in accordance with <i>The Secretary of the Interior's Standards for the Treatment of Historic Properties</i> (The Secretary of the Interior 2005).
Natural resources management	Continue current management activities, including hemlock pest control, water quality monitoring, and fish population assessment. Revegetate former building sites.
Visitor use	Accommodate increased use, which would include continued hiking, camping, fishing, and other compatible recreational activities. Establish a walking tour to view exhibits and restored buildings. Permit day use of the Appalachian Club.
Interpretive features	Upgrade the infrastructure to accommodate additional water use, wastewater treatment, electrical service, and use of roads and parking. Install up to 11 interpretive exhibits throughout the District that focus on natural and cultural resources, history of Elkmont, history of Park establishment, and historical perspective of Chapman and Townsend
Access / circulation	<ul style="list-style-type: none"> • Relocate road gate on Little River Road to east end of Little River trailhead parking area. • Relocate gate or install new gate at beginning of Jakes Creek Road. • Resurface gravel path in Daisy Town from Appalachian Clubhouse to road to Jakes Creek Cemetery. • Pave Little River Trailhead : 350 linear feet. • Pave Daisy Town loop: 1,111 linear feet. • Pave orientation parking access road: 400 linear feet. • Resurface gravel walking path from Little River Trailhead to Spence cabin (#42): 550 linear feet. • Construct walking path from orientation parking lot leading along Elkmont Road to base of Wonderland steps: 550 linear feet. • Pave Road from Elkmont Road to rear of hotel: 750 linear feet. • Repave one lane asphalt road off Catron Branch Road from hotel parking to Beaman cabin (58-8H): 350 linear feet. • Place gravel on road segment from roadway to Paine cabin (#58-2B): 300 linear feet. • Construct a path from base of Wonderland steps in vicinity of historic walkway on west side of steps to the top of the steps: 400 linear feet (D2).
Parking	Construct four parking areas. If Wonderland Hotel is reconstructed (D2), include additional parking area behind hotel.

Table 2-10: Summary of Implementation Elements for Alternative D

Element	Action
Utilities	Add restroom facility and sprinkler system to the day use area of the Appalachian Club. Construct water supply upgrades: <ul style="list-style-type: none"> • 1,300 linear feet of water line to Appalachian Clubhouse. • If Wonderland Hotel is removed (D1), include 7,500 linear feet of 6-inch water line to service Wonderland cabins. • If Wonderland Hotel is reconstructed (D2), include 7,500 linear feet of 8-inch water line to service hotel, annex, and Wonderland cabins. Add dry sprinkler system to hotel and annex.
	<ul style="list-style-type: none"> • Water service lines from individual buildings to main water lines. Construct wastewater system upgrades: <ul style="list-style-type: none"> • 640 linear feet of gravity sewer line from Appalachian Clubhouse. • 600 linear feet of gravity sewer line serving Wonderland cabins. • 4-inch gravity sewer line from individual cabins to sewer main. • 600 linear feet of 2-inch, low-pressure, sewer force main serving Paine cabin. • 3,200 linear feet of 3-inch sewer force main from rear of Wonderland Hotel to existing sewer line in campground. • 225 cubic foot flow equalization basin at the wastewater treatment plant.
Landscape treatment	Retain foundations, rock walls and other cultural features where they do not pose a safety hazard to visitors Reduce stabilization requirements by removing some contributing structures. Eliminate costs associated with the rental or lease of offsite curatorial facilities.
Park operations and staffing	Increase operation and maintenance requirements to maintain the infrastructure and the buildings retained and to process special use permits. For Alternative D2, also increase operation and maintenance requirements for the curatorial facilities, and staff time and resources for educational programs and for staffing the curatorial facilities.

Two options for the Wonderland Hotel and Annex are included in this alternative. Alternative D1 would remove both buildings and revegetate the area. Alternative D2 would reconstruct the Wonderland Hotel in a manner representative of its historic configuration. The hotel would be used for public purposes and Park administrative needs in conjunction with the restored and rehabilitated annex. Both the hotel and the annex would be used primarily for curatorial purposes, although public exhibit spaces would be provided.

All of the remaining contributing structures would be removed. Removal would be accomplished either by mechanical means or by hand removal. Foundations and buried features would not be excavated. Following removal, former building sites would be revegetated with plants propagated from native seed sources and salvaged plants collected within the District.

Alternative D1 would include all proposed infrastructure improvements described for Alternative B. In addition, Alternative D1 would address a Park need for housing for visiting scientists by providing temporary housing in six Wonderland Club cabins. This housing would require water and sewer service, and improved access and parking.

Alternative D2 would provide housing for visiting scientists and also would address a Park need by providing curatorial storage. The reconstruction of the Wonderland Hotel and restoration and

2.0 ALTERNATIVES

rehabilitation of the annex under Alternative D2 would provide the Park with needed curatorial facilities and additional exhibits in the lobby of the hotel. These improvements would require water and sewer service, and improved access and parking. To accommodate these improvements, water and sewer service to the Wonderland Hotel and annex, as well as improved access and parking would be needed under D2.

Proposed improvements for both alternatives are described below.

2.7.6.1 *Water*

Water demands of Alternative D1 were determined using the methods described in Section 2.2.5. In addition to water needs described in Alternative B, water would be needed to service the cabins used by visiting scientists. It would also be necessary to provide a fire suppression system, as described in Section 2.2.5, for each of the cabins for which overnight housing is proposed. Therefore, as shown in Table 2-18, the total water demand generated by Alternative D1 would be 2,835 gallons per day.

A fire suppression system that met the National Fire Protection Act 13R standard would be installed in each cabin to be used for lodging. The water requirements of such systems are presented in Section 2.2.5. These volumes were not used to calculate daily water demand, but were employed in the sizing of water pipelines, identified in Table 2-10, to ensure that adequate flow for fire suppression would be available.

For Alternative D2, additional restrooms for use by staff and the public would be provided at the Wonderland Hotel. As shown in Table 2-18, total water demand for Alternative D2 would be 4,544 gallons per day. As a result, instead of the 6-inch-diameter water pipeline required for Alternative D1, Alternative D2 would need an 8-inch-diameter pipeline (see Table 2-10). Because dry fire suppression is proposed for the hotel and annex curatorial facility in Alternative D2, the need for water for fire suppression would not differ between the alternatives.

2.7.6.2 *Wastewater*

Based on the water demand described above, Alternative D1 would result in a wastewater discharge of 2,268 gallons per day. Alternative D2 would result in wastewater discharge of 3,635 gallons per day.

Details regarding wastewater system improvements are provided in Table 2-20. In some areas, sewage could be conveyed in gravity lines. Alternative D2 would require a 6-inch-diameter gravity line from the hotel and annex that would not be needed for Alternative D1. In addition, for both alternatives, grinder pumps would be needed behind cabins used for lodging, a low-pressure sewer force main would be required to serve the Paine cabin, and a sewage pump station would move wastewater through a low-pressure sewer force main running from rear of Wonderland area to the existing sewer line in Elkmont Campground.

Wastewater generated during peak use periods in combination with the peak wastewater flows from the campground would exceed the design capacity of the existing wastewater treatment plant. Therefore, both options for Alternative D would include construction of a flow equalization basin east of the plant. By storing peak inflows and allowing treatment of the wastewater after the peak

had subsided, the wastewater generated by this alternative could be treated by the existing treatment facility.

2.7.6.3 Roads

Proposed road improvements necessary to implement Alternative D would be similar to those described in Alternative B. However, Alternative D must also provide vehicular access to and from the cabins designated for use by visiting scientists. The road improvements would have to accommodate very few vehicle trips, but would have to provide access in all weather conditions and allow two-way traffic. Therefore, in addition to the infrastructure modifications specified under Alternative B, Alternative D would include widening and paving of portions of roads leading to the cabins.

2.7.6.4 Parking and Access

Parking would be provided at each of the cabins to enable the visiting scientists to load and unload equipment. The number of parking spaces made available to the scientists would be as few as one per cabin. In addition, the existing Jakes Creek Road is proposed to be used as a trail leading to exhibits at the Chapman cabin. To accommodate these features, in addition to the parking that would be constructed under Alternative B, Alternative D1 would require repair of Jakes Creek Road to accommodate the need for a stable walking surface. In addition, under D2, a path would be constructed from the base of the Wonderland Hotel steps in the vicinity of the historic walkway on the west side of the steps to the top of the steps.

In addition to the facilities required for Alternative D1, Alternative D2 would need additional parking to serve the Wonderland Hotel. Day visitors, researchers, and NPS curatorial staff would require an additional 50 parking spaces behind the Wonderland Hotel. A 3,000-square-yard, pervious concrete, parking area would meet this need. In addition, the orientation parking area would be expanded to 25 spaces to provide additional parking as visitation increased.

2.7.6.5 Other Requirements

Other actions associated with Alternative D would address safety or aesthetics:

- A visual screen for all proposed parking areas would be created using plant materials relocated from other areas in the District. The vegetative screening would reduce the visual intrusion of the parking areas into the cultural landscape.
- The footings of a small footbridge over Bearwallow Branch would be repaired and the surface would be restored. These actions would improve pedestrian safety.

2.7.7 Estimated Development Costs

The estimated total one-time capital cost for implementation of Alternative D1 would be \$10,813,508. The estimated total one-time capital cost for Alternative D2 would be \$21,586,976. The estimated annual operating costs for implementation of Alternative D1 are \$233,831 and \$295,572 for Alternative D2. All estimates are in 2010 dollars. An itemized list of costs and post-construction operation and maintenance costs is provided in Appendix C. Total costs of Alternative D are based on funds necessary to perform:

2.0 ALTERNATIVES

- building removal, rehabilitation, restoration, preservation, and reconstruction
- infrastructure improvements, including
 - parking lots (improvements and new lots)
 - road system improvements
 - water system improvements
 - wastewater system improvements
- furniture and fixtures
- vegetation management
- resource education components
- mitigation measures to be implemented as part of the alternative
- resource and visitor protection patrols

2.8 ALTERNATIVE E

2.8.1 Concept

Alternative E would emphasize use of some buildings for public lodging and visiting scientist housing, and retention of others for interpretive purposes. In-depth educational programs for the general public would be provided. Emphasis would be on restoration of the cultural character of multiple components of the District.

This alternative would result in greater intensity of reuse by providing overnight accommodations for larger numbers of people, including limited dining facilities, but it would also maintain a commitment to visitor education. An option to participate in structured educational programs would be made available to lodging guests.

Public overnight use would be limited to the Wonderland Club. Housing for visiting scientists would be restricted to Millionaire's Row. Alternative E2 would include reconstruction of the Wonderland Hotel and rehabilitation of the annex for public lodging.

Public lodging operations and the educational programs would be operated by a concessioner, but the visiting scientist housing would be operated by the National Park Service. The concessioner educational programs included in this alternative would be in addition to those provided free to the public seasonally by the National Park Service at the campground. Some restoration of native plant communities would occur in areas where buildings were removed.

Table 2-11 summarizes the proposed treatment for all buildings under Alternative E. The site plan for the alternative is depicted on Figure 2-7.

Table 2-11: Buildings Summary for Alternative E

Area/Buildings	Status	Uses
Wonderland Club		
Wonderland Hotel	E1: Remove E2: Reconstruct to 1928 footprint	E1: Restoration of native plant communities/wayside exhibit E2: Overnight lodging; meeting rooms; dining hall; exhibits in lobby and on porch; resource education
Annex	E1: Remove E2: Restore exterior and rehabilitate interior	E1: Restoration of native plant communities E2: Overnight lodging
Cabins	Rehabilitate six contributing and one non-contributing cabins	Overnight lodging for groups and families
Millionaire's Row	Rehabilitate six contributing cabins and one garage; remove two non-contributing cabins	Visiting scientist housing; storage; walking tour; wayside exhibits; restoration of native plant communities
Daisy Town		
Appalachian Clubhouse	Restore exterior, rehabilitate interior	Public rental and day use; walking tour with interior self-guiding museum exhibits and wayside exhibits; structured education programs
Cabins	Restore exterior of all 15 contributing cabins and one non-contributing cabin to historic configuration	Walking tour with wayside exhibits
Society Hill	Restore Chapman cabin; remove others	Wayside exhibits; restoration of native plant communities

2.0 ALTERNATIVES

2.8.2 Land Protection

Alternative E would provide land protection by preserving a variety of cultural resources and some natural resources. Although most of the contributing structures in Society Hill would be removed, Alternative E would retain the majority of the remaining buildings in the District for lodging purposes and for cultural resource interpretation.

Restoration and rehabilitation of many of the buildings within the District is consistent with NPS policies geared towards protection of cultural resources. Reconstruction of the Wonderland Hotel in Alternative E2 would address an option requested by the public for overnight stays in the hotel; however, reconstruction would be subject to NPS policy review. The buildings would be retained along with all significant cultural landscape features, providing a community setting with historical interpretation components.

Natural resources would be protected over a portion of the District. Native plant communities would be restored in most of the Society Hill area, portions of Millionaire's Row and the areas of the Wonderland Club where buildings were removed.

2.8.3 Cultural Resource Management

Alternative E would provide for cultural resource management consistent with the Park's mission by proposing exterior restoration of some of the buildings in all areas of the District. In some cases, the interiors also would be restored or rehabilitated.

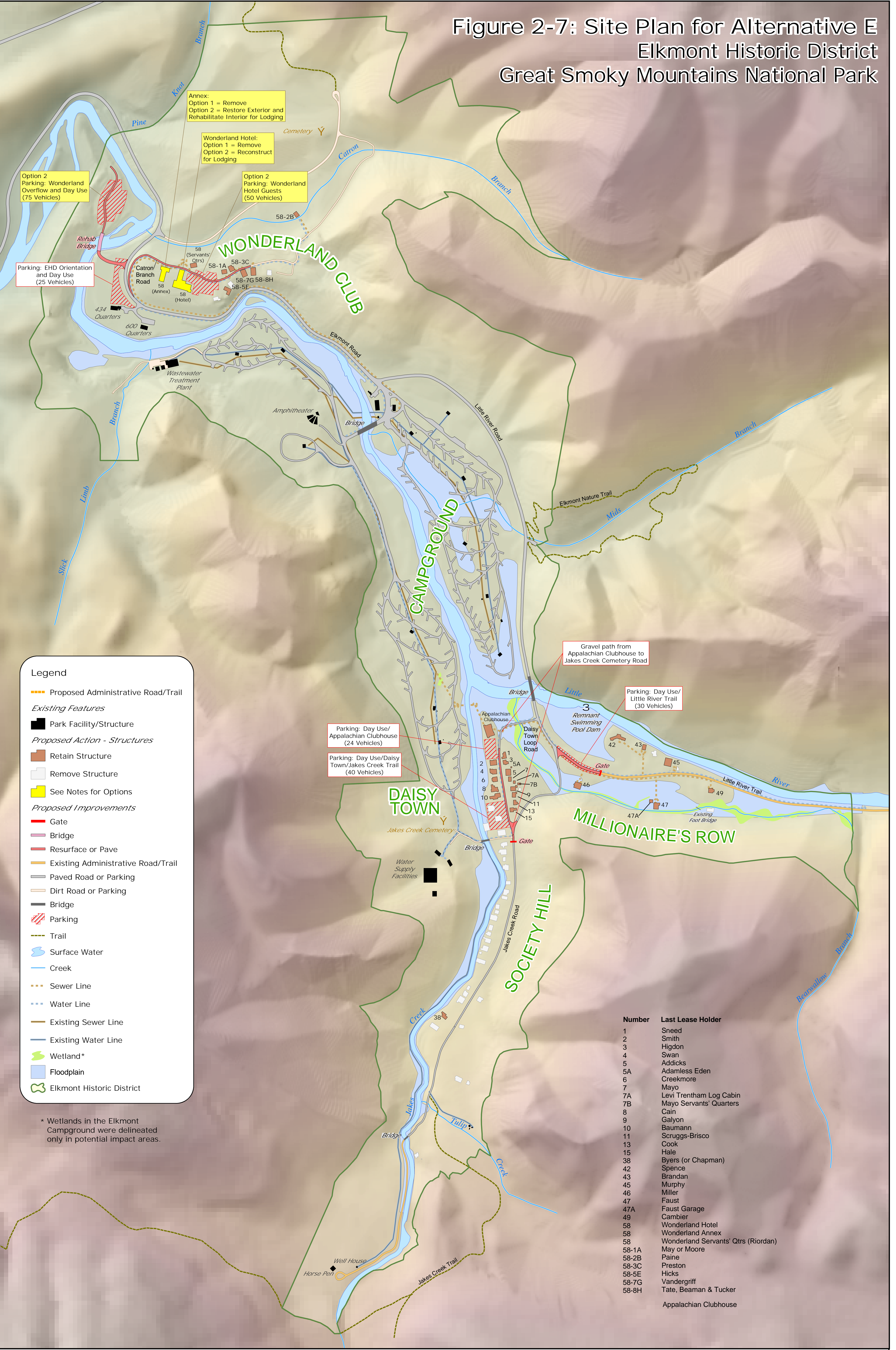
- In Daisy Town, 16 cabins and the Appalachian Clubhouse would be restored to their historical exterior appearance. The Appalachian Clubhouse would also be rehabilitated on the interior to allow for day use and would be equipped with exhibits to serve as a self-guiding museum.
- The Chapman cabin (#38) in Society Hill would be restored on the exterior.
- In Millionaire's Row, the exterior and interior of the Spence cabin (#42) would be restored, and it would be used for visiting scientist housing along with five other cabins in Millionaire's Row.
- One garage in the Millionaire's Row area would be restored on the exterior and rehabilitated on the interior to be used for administrative purposes.
- Seven cabins in the Wonderland Club would be restored and rehabilitated on the interior to accommodate public overnight lodging.

All of the buildings retained within Daisy Town, with the exception of the five non-contributing cabins proposed for removal, would be preserved. An existing walking path, in the location of the boardwalk that was present in Daisy Town into the 1920s, would be resurfaced with gravel and would aid in separating pedestrian traffic from vehicular traffic. The path would extend from the Appalachian Clubhouse south to Jakes Creek Cemetery Road.

Alternative E2 would reconstruct the Wonderland Hotel to its 1928 historic configuration and use it for public lodging. Reconstruction of the Wonderland Hotel would be performed in compliance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (The Secretary of the Interior 2005).

Alternative E would protect and perpetuate cultural resources by preserving buildings and associated landscapes throughout the District. This alternative could potentially reuse all contributing buildings in the Wonderland Club and Millionaire's Row areas. Where safety

Figure 2-7: Site Plan for Alternative E
Elkmont Historic District
Great Smoky Mountains National Park



considerations allowed, retention of cultural landscape features, such as stonework and foundations, where buildings were removed would provide opportunities for viewing former building sites. Appendix C provides measures to avoid potential impacts to shallow archeological deposits and recommendations for specific buildings or groups of buildings.

2.8.4 Natural Resource Management

Alternative E would restore disturbed areas with plants propagated from native seed sources and salvaged plants collected within the District. Seed would be harvested within the District by NPS staff. Plant materials could be transplanted from locations within the District to restore the former building sites, create visual buffers to screen parking lots and roads, and stabilize soil.

More buildings would be retained under Alternative E than in the alternatives previously described, and the proposed use of these buildings would be more intensive, with additional infrastructure needs to accommodate housing and lodging. To protect natural resources, overnight use by the public would be limited to the Wonderland Club area, and overnight use by visiting scientists would be restricted to the Millionaire's Row cabins. Central trailhead parking would be provided to limit vehicular intrusion into the site.

Most of the plant communities within the Society Hill area would remain and restoration with native species would occur where plant communities were disturbed. Natural resource management practices concentrating on removal of non-native species, treatment of hemlock woolly adelgid infestations, and monitoring would continue at their current levels.

2.8.5 Interpretation and Visitor Use

Table 2-16 summarizes the education components that would be associated with Alternative E. The reconstructed hotel (Alternative E2 only) and other public lodging facilities within the District would be operated by a concessioner. The concessioner would be responsible for providing in-depth, resource-based educational opportunities for overnight guests.

The Appalachian Clubhouse would be rehabilitated on the interior for public rental and day use.

Alternative E would include interpretive features, such as wayside exhibits or other resource education components. Displays would focus on cultural history, natural history, the logging history of the area and the construction of the railroad that led to the establishment of the town of Elkmont, and Colonel Chapman's role in the Park establishment.

A wayside exhibit would be placed adjacent to the synchronous firefly habitat to educate the public on the natural history of this species. The Elkmont Nature Trail brochure would be revised to include historical information about Elkmont and would emphasize the integration of cultural and natural resource themes.

A wayside exhibit would be installed at the Spence cabin (#42) describing Colonel Townsend's role in the development of the town of Elkmont. Interior exhibits would be installed at the Spence cabin that would include a historical perspective of the importance of this building and a history of the establishment and operation of the Little River Lumber Company. A wayside exhibit would be installed at the Murphy cabin (#45), describing the establishment and operation of the Little River Railroad.

2.0 ALTERNATIVES

Alternative E would include enhanced opportunities for seasonal natural and cultural resource education programs. While some NPS-sponsored programs would still occur within the District, additional programs would be offered by the concessioner to individuals using lodging accommodations. These programs would be included in the cost of the lodging fee and would be provided as an optional activity for lodging visitors.

Alternative E would create opportunities for emotional and intellectual connections to the natural and cultural resources of the District by providing visitors with opportunities to learn about Elkmont's human occupation while maintaining and allowing regeneration of ecosystems where buildings were removed. This alternative would maintain existing levels of traditional recreation, such as hiking, fishing, and camping, and would add the option for overnight guests to participate in structured educational programs.

Alternative E would restore a representative collection of buildings in the District to provide a sense of its character and community. Retaining some landscape features such as stonework and foundations would provide opportunities for interpretation of sites where buildings were removed.

2.8.6 Facilities Development with Detailed Site Plans for Alternative E

Table 2-12 summarizes actions that would be taken within the Elkmont Historic District to implement Alternative E. Additional details regarding this alternative are provided in Tables 2-15 through 2-21 at the end of this chapter.

Under Alternative E, 16 cabins or buildings in Daisy Town, the Appalachian Clubhouse, the Chapman cabin (#38) in Society Hill, six cabins, and one garage in Millionaire's Row, and seven cabins in the Wonderland Club would be restored on the exterior. The cabins in Daisy Town would be preserved on the interior. The Chapman cabin would be preserved on the interior and restored on the exterior to allow for use as an exhibit. The interior of six cabins in Millionaire's Row and the Appalachian Clubhouse would be rehabilitated. Housing for visiting scientists would be provided at six cabins in Millionaire's Row and public rental as a day use facility would be provided at the Appalachian Clubhouse. The interior of the seven cabins in the Wonderland Club would be rehabilitated for use as public lodging facilities.

Two options for the Wonderland Hotel and Annex are under consideration in this alternative. Alternative E1 would include removal of both buildings and restoration of native plant communities. Alternative E2 would reconstruct the Wonderland Hotel in a manner representative of its historic configuration, in conjunction with restoration of the exterior and rehabilitation of the interior of the annex. Both the hotel and annex would be used for public lodging.

All of the remaining contributing structures not noted above would be removed. Removal would be accomplished either by mechanical means or by hand removal. Foundations and buried features would not be excavated. Following removal, former building sites would be restored with plants propagated from native seed sources and salvaged plants collected within the District. Restoration of plant communities would stabilize the soil and reduce erosion and subsequent sedimentation into surrounding water bodies, floodplains, wetlands, and other sensitive natural areas.

Table 2-12: Summary of Implementation Elements for Alternative E

Element	Action
Use of contributing structures	Retain 16 cabins / buildings in Daisy Town, the Chapman cabin in Society Hill, six cabins in Millionaire's Row, seven cabins in the Wonderland Club, and the Appalachian Clubhouse. Remove the Wonderland Hotel and Annex under Alternative E1. Under Alternative E2, the reconstruct the hotel and rehabilitate the annex for lodging purposes. Remove all other contributing structures.
Measures for buildings retained	Restore exterior to 1920s or 1930s appearance and preserve interior of Daisy Town and Chapman cabins. Restore exterior of Appalachian Clubhouse and rehabilitate interior to allow for public rental and day use. Restore exterior and rehabilitate interior of cabins retained in Millionaire's Row and in the Wonderland Club for lodging purposes. Under Alternative E2, restore exterior of annex and rehabilitate interior for lodging; reconstruct Wonderland Hotel to be used for lodging.
Natural resources management	Continue current management activities, including hemlock pest control, water quality monitoring, and fish population assessment. Revegetate former building sites.
Visitor use	Accommodate increased use, which would include continued hiking, camping, fishing, and other compatible recreational activities. Upgrade the infrastructure to accommodate additional water use, wastewater treatment, electrical service and use of the transportation system.
Interpretive features	Install interpretive features at up to 14 locations throughout the District. Provide an information kiosk, revised brochure, wayside exhibits, and interior exhibits, focusing on natural and cultural resources, history of Elkmont, history of Park establishment, and historical perspective of Chapman and Townsend.
Access / circulation	<ul style="list-style-type: none"> • Relocate road gate on Little River Road to the east end of Little River trailhead parking area. • Relocate existing gate or install new gate at beginning of Jakes Creek Road. • Resurface gravel path in Daisy Town from Appalachian Clubhouse to road to Jakes Creek Cemetery. • Pave Little River Trailhead : 350 linear feet. • Pave Daisy Town loop: 1,111 linear feet. • Pave orientation parking area access road: 400 linear feet. • Resurface gravel walking path from Little River Trailhead to Spence cabin (#42): 550 linear feet. • Pave walking path from orientation parking lot leading along Elkmont Road to base of Wonderland steps: 550 linear feet. • Pave road from Elkmont Road to rear of hotel: 750 linear feet. • Pave one-lane on Catron Branch Road from hotel parking to Beaman cabin (#58-8H): 350 linear feet. • Place gravel on road segment from Catron Branch Road to Paine cabin (#58-2B): 300 linear feet. • Pave one lane at Millionaire's Row to gate for access to cabin Cambier (#49): 1,167 linear feet. • Construct a path from base of Wonderland steps in vicinity of historic walkway on west side of steps to the top of the steps: 400 linear feet. <p>If Wonderland Hotel is reconstructed:</p> <ul style="list-style-type: none"> • Upgrade or replace existing bridge over Little River to two lanes to connect with Wonderland overflow parking area across the river. • Construct a walking path from Wonderland overflow parking: 800 linear feet.
Parking	Construct four parking areas plus parking at cabins proposed for lodging If Wonderland Hotel is reconstructed, construct: <ul style="list-style-type: none"> • Parking area behind hotel.

Table 2-12: Summary of Implementation Elements for Alternative E

Element	Action
Utilities	<ul style="list-style-type: none"> • Remote parking across the Little River from the Wonderland Hotel, which would be accessed by the upgraded or new two-lane bridge. <p>Add restroom facilities and sprinkler system to the day use area of the Appalachian Club.</p> <p>Construct water supply upgrades:</p> <ul style="list-style-type: none"> • 1,300 linear feet of 4-inch water line to Appalachian Clubhouse. • 1,750 linear feet of 4-inch water line from Appalachian Clubhouse to Millionaire's Row. • Water service lines from individual buildings to main water lines. • New water supply well and 1,150 linear feet of 4-inch water pipe to connect to system. • For Alternative E1, include 7,500 linear feet 6-inch water line to service Wonderland cabins. • If Wonderland Hotel is reconstructed in Alternative E2, include 7,500 linear feet of 8-inch water line to service hotel and Wonderland cabins; add sprinkler system to hotel and annex.
	<p>Construct wastewater system upgrades:</p> <ul style="list-style-type: none"> • 640 linear feet of 8-inch gravity sewer line from Appalachian Clubhouse. • 600 linear feet of 8-inch gravity sewer line serving Wonderland cabins. • 4-inch gravity sewer line from individual Wonderland cabins to sewer main. • 600 linear feet of 2-inch, low-pressure sewer force main serving Paine cabin. • 3,200 linear feet 3-inch sewer force main from rear of Wonderland Hotel to existing sewer line in campground. • 225 cubic foot flow equalization basin at the wastewater treatment plant. • 2,400 linear feet of 3-inch, low-pressure, force main from Appalachian Clubhouse to Millionaire's Row cabins. • Sewage grinder pump stations and one sewage pump to service six Wonderland cabins.
	<p>If Wonderland Hotel is reconstructed in Alternative E2:</p> <ul style="list-style-type: none"> • Implement 5,000 gallon per day alternative wastewater management approach during peak season, such as drip irrigation system located outside the District, or piping or trucking sewage to the Gatlinburg treatment plant. • 6-inch gravity sewer lines for Wonderland Hotel and Annex.
	<p>Retain foundations, rock walls, and other cultural features where they do not pose a safety hazard to visitors.</p>
	<p>Reduce stabilization requirements by removing some contributing structures.</p>
	<p>Increase operation and maintenance requirements to maintain the infrastructure and the buildings retained and to process special use permits.</p>
	<p>Increase staff time and resources for educational programs conducted by NPS at the Appalachian Clubhouse, and for management of the concessioner contract under E2.</p> <p>(Maintenance of buildings used for public lodging would be the responsibility of the concessioner.)</p>

Alternative E1 would include all of the infrastructure needs included for Alternative B. However, Alternative E1 would emphasize the reuse of some buildings for interpretive purposes, lodging for the general public and housing for visiting scientists.

In addition to the improvements proposed in Alternative E1, Alternative E2 would reconstruct the Wonderland Hotel and rehabilitate the annex for overnight guest lodging. Additional interpretive exhibits would be installed in the lobby and on the porch of the hotel. A 100-seat restaurant open only to overnight lodging guests and visiting scientists in Elkmont would be provided within the hotel. This alternative also would provide educational programs as part of the lodging fee. To accommodate these improvements, water and sewer service to the Wonderland Hotel and Annex would be necessary, as well as improved access and parking for the general public at the Wonderland Hotel.

Proposed improvements for both alternatives are described below.

2.8.6.1 Water

Water demands of Alternative E1 were determined using the methods described in Section 2.2.5. As shown in Table 2-18, the total water demand generated by Alternative E1 would be 7,360 gallons per day. This would include water use by day use visitors in public restrooms in the Appalachian Clubhouse, visiting scientists in cabins, and lodgers in cabins.

A fire suppression system that met the National Fire Protection Act 13R standard would be installed in each cabin to be used for lodging. The water requirements of such systems are presented in Section 2.2.5. These volumes were not used to calculate daily water demand, but were employed in the sizing of water pipelines, identified in Table 2-12, to ensure that adequate flow for fire suppression would be available.

For Alternative E2, additional restrooms for day use visitors would be provided at the Wonderland Hotel. There also would be water use by lodgers in the hotel and annex, and by the hotel restaurant. As shown in Table 2-18, total water demand for Alternative E2 would be 17,970 gallons per day. Fire suppression systems that met the National Fire Protection Act 13R standard would be installed in the hotel and annex and were accounted for in the sizing of the water pipelines in Table 2-12.

The maximum capacity of the present system is 35,000 gallons per day. Current peak season demand is 22,240 gallons per day. Therefore, to ensure that sufficient water always would be available and to provide redundancy in the event of a problem with the present system, both options for Alternative E would include the installation of a new water supply well and distribution lines. The well would be located in the Millionaire's Row area.

2.8.6.2 Wastewater

Based on the water demand described above, Alternative E1 would result in a wastewater discharge of 5,888 gallons per day. Alternative E2 would result in wastewater discharge of 14,376 gallons per day.

Details regarding wastewater system improvements are provided in Tables 2-12 and 2-20. In some areas, sewage could be conveyed in gravity lines. However, as shown in the tables, pumps and force

2.0 ALTERNATIVES

mains also would be required to move sewage from within the Elkmont Historic District to the existing wastewater treatment plant.

Peak wastewater flows generated by both Alternative E options, combined with the peak wastewater flows from the campground, would exceed the design capacity of the existing wastewater treatment plant. For Alternative E1, the construction of a flow equalization basin east of the plant would adequately address the problem. By storing peak inflows and allowing treatment of the wastewater after the peak had subsided, the wastewater generated by this alternative could be treated by the existing treatment facility.

Alternative E2 also would require the construction of a flow equalization basin east of the plant. However, additional measures would be required to handle an overage, estimated at 5,000 gallons per day during the peak season. Options could include constructing a drip irrigation system at a suitable location outside the District, installing a sewer line to carry excess wastewater to the Gatlinburg treatment plant, or because of the small volume, trucking the wastewater to another treatment plant.

2.8.6.3 Roads

Most of the changes to roads would be the same as the road improvements described under Alternative B. Additional road modifications necessary to implement Alternative E would include minor widening and paving of roads to the cabins in the Wonderland Club and in Millionaire's Row.

Alternative E2 also would require substantial construction to provide access to parking areas. This alternative would include upgrading or replacing the existing one-lane bridge over the Little River, across the road from the Wonderland Hotel and north of the modern 434 and 600 quarters. The new two-lane bridge would be 32 feet wide and approximately 125 feet long. The bridge would be wide enough to include a walking trail. The existing one-lane road leading to the bridge also would be widened, and a new parking area would be constructed north of the bridge. The condition of the existing bridge would be examined to determine design and construction requirements for rehabilitation or replacement of this structure.

2.8.6.4 Parking and Access

Alternative E would include parking at the District orientation area (25 spaces), Little River Trailhead (30 spaces), Appalachian Clubhouse (24 spaces), and Daisy Town / Jakes Creek Trailhead (40 spaces). At least one parking space also would be required at each of the cabins proposed for visiting scientist lodging in Millionaire's Row to enable the scientists to load and unload equipment.

Alternative E2 would require 128 additional parking spaces near the Wonderland Hotel. This parking would be provided by the construction of two new parking lots. One would be adjacent to the east side of the Wonderland Hotel and the other would be across the Little River bridge at the area where air quality monitoring equipment is now located. Pathways would be provided from the lots to the hotel.

Access modifications for Alternative E would include minor repairs and repaving of a portion of Daisy Town Loop Road and Jakes Creek Road to provide a stable walking surface for access to the Chapman cabin and proposed wayside exhibits.

2.8.6.5 Other Requirements

Other actions associated with Alternative E would address safety or aesthetics:

- A visual screen for all proposed parking areas would be created using plant materials relocated from other areas in the District. The vegetative screening would reduce the visual intrusion of the parking areas into the cultural landscape.
- The footings of a small footbridge over Bearwallow Branch would be repaired and the surface would be restored. These actions would improve pedestrian safety.
- One lane asphalt on Catron Branch Road from hotel parking to Beaman (58-8H) cabin to provide safe access to the last cabin on the road.
- Gravel would be placed on the road segment from Catron Branch Road to the Paine (58-2B) cabin.

2.8.7 Estimated Development Costs

The estimated total one-time capital cost for implementation of Alternative E1 would be \$14,813,818. The estimated total one-time capital cost for Alternative E2 would be \$24,182,166. The estimated annual operating costs for implementation of Alternative E1 are \$419,658 and \$450,928 for Alternative E2. All estimates are in 2010 dollars. An itemized list of costs and post-construction operation and maintenance costs is provided in Appendix C. Total costs of Alternative E are based on funds necessary to perform:

- building removal, rehabilitation, restoration, preservation, and reconstruction
- infrastructure improvements, including
 - parking lots (improvements and new lots)
 - road system improvements
 - water system improvements
 - wastewater system improvements
- furniture, fixtures, and equipment associated with buildings for lodging
- vegetation management
- resource education components
- mitigation measures to be implemented as part of the alternative
- resource and visitor protection patrols

2.9 ALTERNATIVE F

2.9.1 Concept

Alternative F would include the greatest preservation of contributing structures through the reuse of contributing structures, primarily in the form of overnight accommodations and dining facilities for the general public. The emphasis is on rehabilitation of the cultural landscape and social character of the District by retaining all contributing structures that can be preserved or rehabilitated.

Education and interpretation would be provided at the orientation kiosk, on the Wonderland Hotel porch and in the hotel lobby (Alternative F2), in Daisy Town, at the Appalachian Clubhouse, at the Spence cabin in Millionaire's Row, and at the Chapman cabin in Society Hill. An option to participate in structured educational programs would be made available to overnight guests and the general public for a fee in addition to Park programs that already are provided seasonally at the campground for no charge. Protection of natural resources would depend on operational procedures and visitor regulations required of the concession operator.

Table 2-13 summarizes the proposed treatment for all buildings under Alternative F. The site plan for the alternative is depicted in Figure 2-8.

Table 2-13: Buildings Summary for Alternative F

Area/Buildings	Status	Uses
Wonderland Club		
Wonderland Hotel	F1: Remove F2: Reconstruct to 1928 footprint	F1: Restoration of native plant communities; wayside exhibits F2: Overnight lodging; meeting rooms; dining hall; exhibits in lobby, at top of stairs, and on porch; resource education-based programming
Annex	F1: Remove F2: Restore exterior and rehabilitate interior	F1: Restoration of native plant communities F2: Overnight public lodging
Cabins	Restore and rehabilitate all six contributing cabins and two non-contributing cabins	Overnight rental; storage
Millionaire's Row	Restore and rehabilitate six contributing cabins and one garage; remove two non-contributing cabins	Overnight rental; storage Restoration of native plant communities; wayside and interior exhibits
Daisy Town		
Appalachian Clubhouse	Restore exterior and rehabilitate interior	As part of the concession operation; day use; walking tour with interior self-guiding museum exhibits and wayside exhibits
Cabins	Restore exterior of all contributing cabins and return one non-contributing cabin to historic configuration	Walking tour with wayside exhibits
Society Hill	Restore and rehabilitate 15 contributing buildings and 8 non-contributing buildings	Wayside exhibit; overnight rentals

2.0 ALTERNATIVES

2.9.2 Land Protection

Alternative F would provide land protection by being consistent with the Park's mission to preserve a variety of resources. Alternative F would retain most of the contributing structures in the District. While the majority of the buildings would provide lodging, some would be used for visitor education and interpretation. The buildings would be retained along with all significant cultural landscape features, providing a community setting with historical interpretation components. Natural resources would be protected in some areas of the District by restoring native plant communities where buildings were removed, except where parking lots were constructed.

2.9.3 Cultural Resource Management

Alternative F would provide for cultural resource management consistent with the Park's mission by providing exterior restoration of the majority of the contributing structures in all areas of the District.

In Daisy Town, 16 cabins and the Appalachian Clubhouse would be restored to their historical exterior appearance. The Appalachian Clubhouse also would be rehabilitated on the interior to allow for day use and equipped with exhibits to serve as a self-guiding museum. In Daisy Town, the historic walking path would be restored with gravel and used to separate pedestrian and vehicular traffic. The path would extend from the Appalachian Clubhouse south to the road to Jakes Creek Cemetery Road.

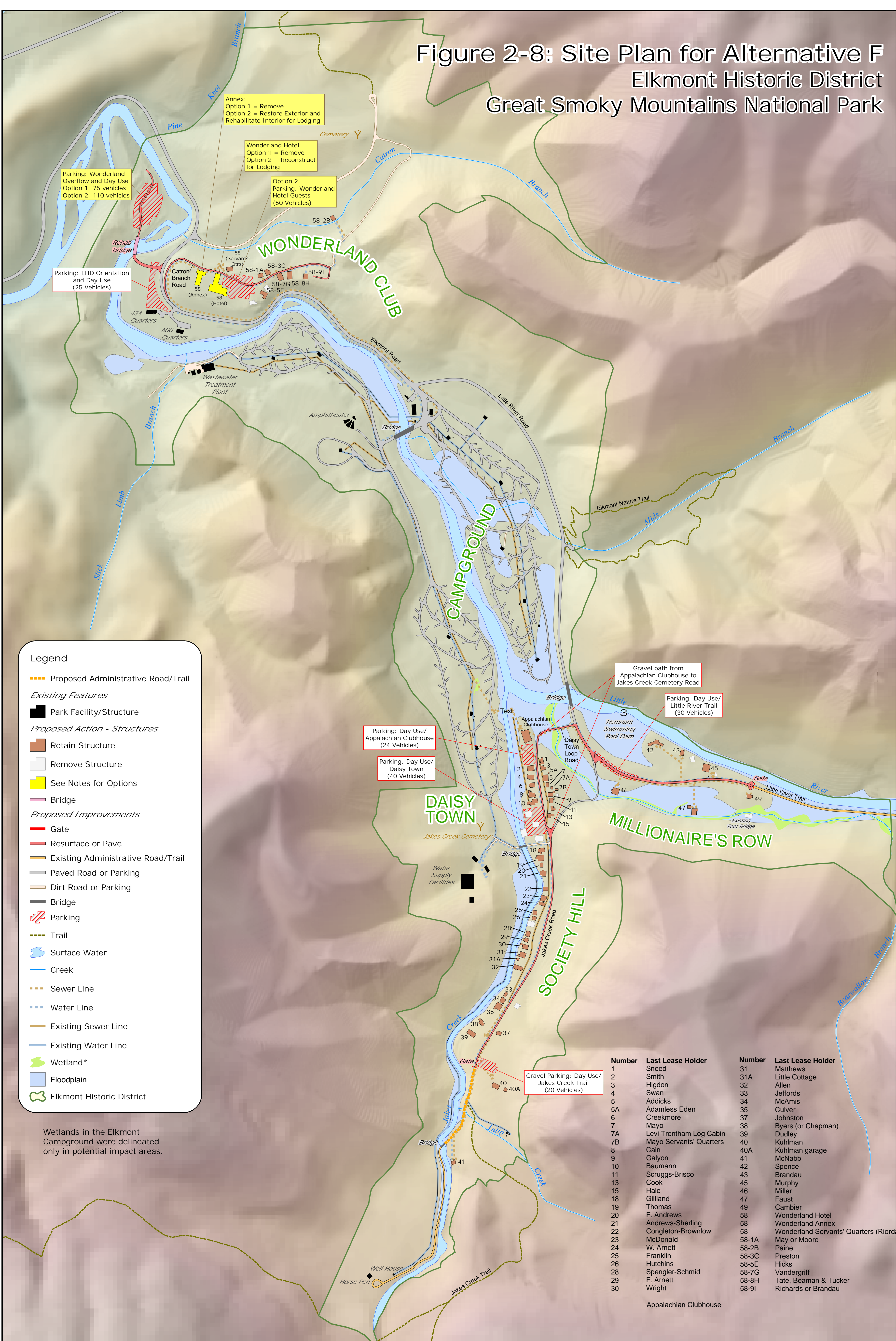
In Society Hill, 22 cabins would be restored on the exterior and rehabilitated on the interior to allow for public lodging. The Chapman cabin (#38) in Society Hill would be retained as the focus for an interpretive exhibit highlighting the contribution of Colonel Chapman to the formation of the Park. One garage would be restored on the exterior and rehabilitated on the interior. A woodshed adjacent to the Kuhlman cabin (#40) also would be retained. In the Wonderland Club, this alternative would restore the exterior and rehabilitate the interior of six cabins in Millionaire's Row and eight cabins for use as overnight lodging for the public.

Rehabilitated cabins would be operated by the concessioner and rented to the public for overnight lodging in the Wonderland area and in Millionaire's Row. All restoration and rehabilitation would take place in accordance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (The Secretary of the Interior 2005).

In Alternative F2, the Wonderland Hotel would be reconstructed to its historic configuration and used for public lodging. Reconstruction of the Wonderland Hotel would have to be performed in compliance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (The Secretary of the Interior 2005). The reconstructed hotel and other lodging facilities within the District would be operated by a concessioner, who would also be responsible for providing resource-based educational opportunities. However, the National Park Service would continue to provide seasonal staff-led education programs for the general public at no charge.

Alternative F would retain buildings and component landscapes in clusters and associations sufficient to provide a sense of the character of the District. Alternative F would retain most contributing buildings for overnight use or as exhibits. This alternative also would provide opportunities to convey the history of several important figures in Elkmont's history. Appendix C provides measures to avoid potential impacts to shallow archeological deposits and

Figure 2-8: Site Plan for Alternative F
Elkmont Historic District
Great Smoky Mountains National Park



recommendations for specific buildings or groups of buildings, and other areas where modifications are proposed.

2.9.4 Natural Resource Management

Most of the existing buildings would be retained under Alternative F. The area would receive intensive use because of day use, use by lodgers, the infrastructure needed to accommodate lodging, interpretive exhibits, and use of the area to access to other areas such as existing trailheads.

Based on the proposed increase in intensity of use and potential increase in demand on resources, natural resource management strategies would be designed to avoid impacts to the Little River, floodplains, wetlands, plant communities, and wildlife habitat. This would include sewage treatment options that would provide protection to aquatic resources in compliance with current water quality standards mandated through law, codes, and policies.

Alternative F would provide restoration with plants propagated from native seed and with salvaged plants collected in the District. Native plant species would be used to revegetate the former building sites, create visual buffers, and stabilize the soil. Natural resource management practices concentrating on removal of non-native species, treatment of hemlock woolly adelgid infestations, and monitoring would continue at their current level. This alternative would manage potential visitor impacts through operational procedures and regulations required of the concession operator.

2.9.5 Interpretation and Visitor Use

Table 2-16 summarizes the education components that would be associated with Alternative F. This alternative would incorporate all of the interpretive exhibits and materials described in Alternative A, along with additional exhibits focused on cultural history, natural history, architecture, the logging history of the area, construction of the railroad, and establishment of the town of Elkmont.

This alternative would include interpretive features, such as wayside exhibits and other resource education components. Alternative F also would include displays that focused on cultural history, natural history, architecture, the logging history of the area and the construction of the railroad that led to the establishment of Elkmont. One wayside exhibit would provide a historical perspective on Colonel Chapman's role in establishment of the Park. Another wayside exhibit would be placed adjacent to the synchronous firefly habitat to educate the public on the natural history of this species. The brochure currently available for interpretation of the Elkmont Nature Trail would be revised to include historical information about Elkmont and would emphasize the integration of cultural and natural resource themes. Exhibits would be installed inside the Spence cabin (#42) that would include a historical perspective of this building and a history of the establishment and operation of the Little River Lumber Company.

NPS-sponsored programs would still occur within the District at no charge. Additional programs would be offered by the concessioner to individuals staying overnight in lodging accommodations, or to others for a fee. These programs would be fee-based and would be provided as an optional activity for visitors. These activities may include in-depth cultural and natural resource education opportunities.

2.0 ALTERNATIVES

Alternative F would provide the opportunity for the general public to stay overnight inside the Park in facilities other than campgrounds. It would maintain existing levels of traditional recreation such as hiking, fishing, and camping, and would provide visitors with additional opportunities to learn about the natural resources that comprise Elkmont, either as a day use visitor or through programs offered for overnight guests. Alternative F would restore and rehabilitate the majority of the buildings, providing a sense of the historical character of the District, and provide visitors with opportunities to learn about Elkmont's human occupation. This alternative also would include the option of participating in structured educational programs.

2.9.6 Facilities Development with Detailed Site Plans for Alternative F

Table 2-14 summarizes actions that would be taken within the Elkmont Historic District to implement Alternative F. Additional details regarding this alternative are provided in Tables 2-15 through 2-21 at the end of this chapter.

Table 2-14: Summary of Implementation Elements for Alternative F

Element	Action
Use of contributing structures	Retain 16 cabins / buildings in Daisy Town, the Chapman cabin and 25 other buildings in Society Hill, eight buildings in Millionaire's Row, nine buildings in the Wonderland Club, and the Appalachian Clubhouse. Remove the Wonderland Hotel and Annex under Alternative F1. Under Alternative F2, reconstruct the hotel and rehabilitate the annex for lodging purposes. Remove all other contributing structures.
Measures for buildings retained	Restore exteriors to period of significance appearance and preserve interiors of Daisy Town cabins. Restore exterior of Appalachian Clubhouse and rehabilitate interior to allow for day and self-guiding museum use. Restore exteriors and rehabilitate interiors of cabins retained in Society Hill, Millionaire's Row, and the Wonderland Club for lodging purposes. Under Alternative F2, restore annex exterior and rehabilitate interior for lodging; reconstruct hotel for lodging and dining.
Natural resources management	Continue current management activities, including hemlock pest control, water quality monitoring, and fish population assessment. Revegetate former building sites.
Visitor use	Accommodate increased use, which would include continued hiking, camping, fishing, and other compatible recreational activities. Upgrade infrastructure to accommodate additional water use, wastewater treatment, electrical service, and use of roads and parking.
Interpretive features	Install interpretive exhibits at up to 14 locations throughout the District. Wayside exhibits, an orientation kiosk, a revised brochure, and interior exhibits would focus on natural and cultural resources, history of Elkmont, history of Park establishment, and a historical perspective of Chapman and Townsend
Access / circulation	<ul style="list-style-type: none"> Relocate road gate on Little River Road to the east end of Millionaire's Row at the Cambier cabin (#49). Relocate existing gate or install new gate at beginning of Jakes Creek Road. Resurface path in Daisy Town from Appalachian Clubhouse to road to Jakes Creek cemetery. Pave Little River trailhead: 350 linear feet. Pave Daisy Town loop: 1,111 linear feet. Pave orientation parking area access road: 400 linear feet. Upgrade gravel walking path loop from Little River Trailhead to Spence cabin (#42): 550 linear feet. Provide walking path from orientation parking lot leading along Elkmont Road to base of Wonderland steps: 550 linear feet. Construct road from Elkmont Road to rear of Hotel: 750 linear feet.

Table 2-14: Summary of Implementation Elements for Alternative F

Element	Action
Parking	<ul style="list-style-type: none"> • Pave one lane on Catron Branch Road from hotel parking to Beaman cabin (#58-8H): 350 linear feet. • Repair one-lane gravel Catron Branch Road from Beaman cabin (#58-8H) to Richards cabin (#58-9I): 250 linear feet. • Place gravel on road segment from Catron Branch Road to Paine cabin (#58-2B): 300 linear feet. • Pave one lane at Millionaire's Row to Cambier cabin (#49): 1,167 linear feet. • Construct path from base of Wonderland steps in vicinity of historic walkway on west side of steps to the top of the steps: 400 linear feet. • Repair / overlay asphalt on Daisy Town Loop Road between Jakes Creek Cemetery Road and Appalachian Clubhouse: 1,111 linear feet.
	If Wonderland Hotel is reconstructed:
	<ul style="list-style-type: none"> • Upgrade existing bridge over Little River to two lanes to connect with Wonderland overflow parking area. • Construct walking path from Wonderland overflow parking: 800 linear feet.
	Six parking areas proposed. If Wonderland Hotel is reconstructed (Alternative F2):
	<ul style="list-style-type: none"> • Construct parking area behind hotel; • Increase Wonderland overflow parking area from 75 spaces to 110 spaces.
	Add restroom facilities and sprinkler system to the day use area of the Appalachian Club.
	Construct water supply upgrades:
	<ul style="list-style-type: none"> • 1,300 linear feet of 4-inch water line to Appalachian Clubhouse. • 1,750 linear feet of 4-inch water line from Appalachian Clubhouse to Millionaire's Row. • 3,400 linear feet of 4-inch water line from Jakes Creek Cemetery water tanks to Jakes Creek storage tank. • Rehabilitate Jakes Creek water storage tank with upgraded access road. • Provide water service lines from individual buildings to main water lines. • Construct new water supply well and 1,150 linear feet of 4-inch water pipe to connect to system. • Install fire protection sprinkler system for all buildings used for overnight lodging.
	If Wonderland Hotel is removed, install 7,500 linear feet of 6-inch water line to service Wonderland cabins. If hotel is reconstructed, install 7,500 linear feet of 8-inch water line to service hotel and Wonderland cabins. Add sprinkler system to hotel and annex
	Construct wastewater system upgrades:
Utilities	<ul style="list-style-type: none"> • 640 linear feet of 8-inch gravity sewer line from Appalachian Clubhouse. • 600 linear feet of 8-inch gravity sewer line serving Wonderland cabins. • 4-inch gravity sewer line from individual cabins to sewer main. • 600 linear feet of 2-inch, low-pressure, sewer force main serving Paine cabin. • 3,200 linear feet of 3-inch sewer force main from rear of Wonderland Hotel to existing sewer line in campground. • 225 cubic foot flow equalization basin at the wastewater treatment plant. • 2,400 linear feet of 3-inch, low-pressure, force main from Appalachian Clubhouse to Millionaire's Row cabins. • 1,200 linear feet of 8-inch gravity sewer line serving Society Hill cabins. • 4-inch gravity sewer service lines from individual cabins on Society Hill to sewer main. • 1,200 linear feet of 3-inch, low-pressure, sewer force main along Jakes Creek Road

Table 2-14: Summary of Implementation Elements for Alternative F

Element	Action
	from Chapman cabin (#38) serving Kuhlman (#40) and McNabb (#41) cabins on Society Hill.
	If Wonderland Hotel is removed in Alternative F1: <ul style="list-style-type: none"> Implement 5,000 gallon per day alternative wastewater management approach during peak season, such as drip irrigation system located outside the District, or piping or trucking sewage to the Gatlinburg treatment plant.
	If Wonderland Hotel is reconstructed in Alternative F2: <ul style="list-style-type: none"> Implement alternative wastewater management approach for up to 15,000 gallons per day during peak season, such as drip irrigation system located outside the District, or piping or trucking sewage to the Gatlinburg treatment plant. 6-inch gravity sewer service for Wonderland Hotel and Annex.
Landscape treatment	Retain foundations, rock walls, and other cultural features where they do not pose a safety hazard to visitors. Reduce stabilization requirements by removing some contributing structures.
Park operations and staffing	Increase operation and maintenance requirements to maintain the infrastructure and the buildings retained. Increase staff time and resources for management of the concessioner contract. (Maintenance of buildings used for public lodging would be the responsibility of the concessioner.)

Under Alternative F, 17 cabins or buildings in Daisy Town, Society Hill, and the Appalachian Clubhouse would be restored on the exterior and used for interpretive purposes. The cabins in Daisy Town would be preserved on the interior, and the exteriors would be restored to allow for interpretation. The interior of the Appalachian Clubhouse would be rehabilitated to allow for day use, and interior exhibits would provide a self-guiding museum. Cabins that have deteriorated beyond repair would not be retained. The 36 remaining cabins on Society Hill, Millionaire's Row, and the Wonderland Club would be restored on the exterior and rehabilitated on the interior for lodging use.

Two options for the Wonderland Hotel and Annex are under consideration in this alternative. Alternative F1 would remove both buildings and revegetate the area. Alternative F2 would reconstruct the Wonderland Hotel in a manner representative of its historic configuration, in conjunction with restoration of the exterior and rehabilitation of the interior of the annex. Both buildings would be utilized for public lodging and dining.

For buildings that were removed, foundations and buried features would not be excavated. Following building removal, former building sites would be restored with native species collected from within the District. Restoration would stabilize the soil and reduce erosion and resulting sedimentation into surrounding water bodies, floodplains, wetlands, and other sensitive natural areas.

In addition to the improvements proposed in Alternative B, Alternative F1 would restore and rehabilitate many of the cabins to provide lodging for Park visitors. To accommodate this alternative, water and sewer service would be provided to these cabins, and access and parking would be improved for the guests.

In addition to the improvements proposed in Alternative F1, Alternative F2 would reconstruct the Wonderland Hotel and Annex for overnight guest rental and provide a 100-seat restaurant open to the general public. The reconstruction of the Wonderland Hotel and Annex would provide opportunities for educational programs and for additional exhibits at the hotel. To accommodate these improvements, water and sewer service would be provided to the Wonderland Hotel and Annex, and access and parking would be improved for guests and concessioner employees.

Proposed improvements for both alternatives are described below.

2.9.6.1 Water

Water demands of Alternative F1 were determined using the methods described in Section 2.2.5. As shown in Table 2-18, the total water demand generated by Alternative F1 would be 18,692 gallons per day. This would include water used by day use visitors in public restrooms in the Appalachian Clubhouse and by lodgers in cabins.

A fire suppression system that met the National Fire Protection Act 13R standard would be installed in each cabin to be used for lodging. The water requirements of such systems are presented in Section 2.2.5. These volumes were not used to calculate daily water demand, but were employed in the sizing of water pipelines, identified in Table 2-14, to ensure that adequate flow for fire suppression would be available.

For Alternative F2, additional restrooms for day use visitors would be provided at the Wonderland Hotel. There also would be water use by lodgers in the hotel and annex, and by the hotel restaurant. As shown in Table 2-18, total water demand for Alternative F2 would be 29,334 gallons per day. Fire suppression systems that met the National Fire Protection Act 13R standard would be installed in the hotel and annex and were accounted for in the sizing of the water pipelines in Table 2-14.

The maximum capacity of the present system is 35,000 gallons per day. Current peak season demand is 22,240 gallons per day. Therefore, to provide sufficient water, both options for Alternative F would include the installation of a new water supply well and distribution lines. The well would be located in the Millionaire's Row area.

Many of the cabins in the Society Hill area are at elevations that are higher than the elevation of the existing water storage tanks and cannot be served by gravity from those tanks. Therefore, both of the Alternative F options would include a new booster pump station to force water through the lines up Society Hill. Also, the existing Jakes Creek water tank would be rehabilitated in either Alternative F option.

2.9.6.2 Wastewater

Based on the water demand described above, Alternative F1 would result in a wastewater discharge of 14,954 gallons per day. Alternative F2 would result in wastewater discharge of 23,467 gallons per day.

Details regarding wastewater system improvements are provided in Tables 2-14 and 2-20. In some areas, sewage could be conveyed in gravity lines. However, as shown in the tables, pumps and force

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mains also would be required to move sewage from within the Elkmont Historic District to the existing wastewater treatment plant.

Peak wastewater flows generated by both Alternative F options, combined with the peak wastewater flows from the campground, would exceed the design capacity of the existing wastewater treatment plant. The construction of a flow equalization basin east of the plant would adequately address the problem during the off-peak season. By storing higher inflows and allowing treatment of the wastewater after flows had subsided, the wastewater generated by this alternative throughout most of the winter and spring could be treated by the existing treatment facility.

Throughout the late spring, summer, and autumn, additional measures would be required to handle an overage, estimated at up to 5,000 gallons per day for Alternative F1 and 15,000 gallons per day for Alternative F2. Options could include constructing a drip irrigation system at a suitable location outside the District, installing a sewer line to carry excess wastewater to the Gatlinburg treatment plant, or because of the small volume, trucking the wastewater to another treatment plant.

2.9.6.3 Roads

Access would be provided to the areas in which cabins were used for lodging use. Each of these areas would require an all-weather, two-way road. In addition to the road improvements described in Alternative B, Alternative F1 would include

- widening and paving a portion of the existing one-lane road beginning at Elkmont Road near the turnoff to Quarters 434 and 600, and ending at the rear of the Wonderland Hotel
- paving a portion of the existing Catron Branch Road from the Wonderland Hotel Parking Lot to the Beaman cabin (58-8H), and from the Beaman cabin to the Richards cabin (58-9I)
- placing gravel on the access road from Catron Branch Road to the Paine cabin (58-2B)

Alternative F2 also would require additional work to provide access to parking areas. This alternative would include upgrading or replacing the existing one-lane bridge over the Little River, across the road from the Wonderland Hotel and north of the modern 434 and 600 quarters. The new two-lane bridge would be 32 feet wide and approximately 125 feet long. The bridge would be wide enough to include a walking trail. The existing one-lane road leading to the bridge also would be widened, and a new parking area would be constructed north of the bridge. The condition of the existing bridge would be examined to determine design and construction requirements for rehabilitation or replacement of this structure.

2.9.6.4 Parking and Access

In comparison to Alternative B, Alternative F1 would require additional parking to serve the cabins in the Wonderland Club, Millionaire's Row, and Society Hill areas. Based on the projected increase in traffic in the Daisy Town, Millionaire's Row, and Society Hill areas, a minimum of 30 more parking spaces would be required in this portion of the District to provide at least one parking space for each cabin where overnight lodging was provided. These parking spaces would be provided as close as practical to the cabins they were serving.

An additional gravel parking lot would be provided for the Jakes Creek Trailhead in front of the Kuhlman cabin (#40). This lot would separate users of the Jakes Creek trail from those visiting for other purposes.

To allow access to the proposed lodging cabins on Millionaire's Row, while preventing and minimizing uncontrolled site impacts, the road gate on Little River Road would be relocated to the upper end of Millionaire's Row at the Cambier cabin (#49). An existing gate on Jakes Creek Road located south of the bridge that crosses Jakes Creek would be relocated to just south of the proposed gravel parking area on Jakes Creek Road.

Alternative F2 also would provide 163 parking spaces near the Wonderland Hotel. This would be accomplished by constructing one additional parking lot and increasing the size of another. The new lot would be located adjacent to the east side of the Wonderland Hotel. The overflow lot across the Little River bridge at the area where air quality monitoring equipment is now located would be expanded to accommodate 110 vehicles. Pathways would be provided from the lots to the hotel.

2.9.6.5 Other Requirements

Other actions associated with Alternative F would address safety or aesthetics:

- A visual screen for all proposed parking areas would be created using plant materials relocated from other areas in the District. The vegetative screening would reduce the visual intrusion of the parking areas into the cultural landscape.
- The footings of a small footbridge over Bearwallow Branch would be repaired and the surface would be restored. These actions would improve pedestrian safety.

2.9.7 Estimated Development Costs

The estimated total one-time capital cost for implementation of Alternative F1 would be \$25,005,753. The estimated total one-time capital cost for Alternative F2 would be \$33,654,498. The estimated annual operating costs for implementation of Alternative F1 are \$439,587 and \$460,294 for Alternative F2. All estimates are in 2010 dollars. An itemized list of costs and post-construction operation and maintenance costs is provided in Appendix C. Total costs of Alternative F are based on funds necessary to perform:

- building removal, rehabilitation, restoration, preservation, and reconstruction
- infrastructure improvements, including
 - parking lots (improvements and new lots)
 - road system improvements
 - water system improvements
 - wastewater system improvements
- furniture, fixtures, and equipment associated with buildings for lodging
- vegetation management
- resource education components
- mitigation measures to be implemented as part of the alternative
- resource and visitor protection patrols

2.10 MITIGATION

Mitigation is a key concept in resource management. It provides a means for improving the accommodation of the proposed management actions for the Elkmont Historic District with the Park's cultural and natural resources and their tolerances for disturbances.

Mitigation and best management practices are regularly used to ensure that the cultural and natural resources of Great Smoky Mountains National Park are protected and preserved for future visitors without impairment. In the legislation that created the National Park Service, Congress charged it with managing lands under its stewardship "in such manner and by such means as will leave them unimpaired for the enjoyment of future generations" (NPS Organic Act, 16 *United States Code* 1). As a result, the National Park Service routinely evaluates and implements mitigation whenever conditions occur that could adversely affect the sustainability of park resources. Some of the mitigation measures that would be applied for the implementation of management actions at the Elkmont Historic District are described below.

2.10.1 Cultural Resources Mitigation

2.10.1.1 *Mitigation Measures for All Cultural Resource*

A memorandum of agreement would be prepared for Section 106 compliance and would stipulate the measures that the National Park Service would follow to mitigate the adverse effects on cultural resources within the Elkmont Historic District. The mitigation measures for the memorandum of agreement (which have not yet been developed) would be prepared in consultation with the Tennessee state historic preservation office, the Advisory Council on Historic Preservation, associated tribes (The Eastern Band of Cherokee Indians and The Chickasaw Nation), and other consulting parties. However, the following general measures would be implemented:

- All proposed preservation treatments for Elkmont contributing structures would be carried out in accordance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (The Secretary of the Interior 2005) to maximize the preservation of the historic building fabric and other character-defining features. Protection of substantial cultural landscape features would follow *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes* (The Secretary of the Interior 1995b).
- Should construction unearth previously undiscovered archeological resources, work would be stopped in the area of the discovery, and the National Park Service would consult with the State Historic Preservation Officer, the Advisory Council on Historic Preservation, and associated tribes as necessary, in accordance with 36 *Code of Federal Regulations* 800.13, "Post Review Discoveries." In the event that human remains were discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (1990) would be followed.
- Areas of sensitive archeological resources would be staked for avoidance or otherwise delineated. Archeological monitoring would occur during construction as needed to further ensure avoidance of sensitive sites.

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- Workers would be informed of the penalties for illegally collecting artifacts or intentionally damaging cultural resources. Workers would also be informed of the correct procedures to follow in the event that previously unknown resources were uncovered during construction.
- Before any construction activity, construction zones would be clearly delineated with stakes or by other means to confine activity to the minimum area required for construction. All protection measures would be clearly stated in the construction specifications, and workers would be instructed to avoid conducting activities beyond the construction zone.
- To protect against destruction or degradation of archeological resources, no equipment would be operated off existing roads unless the following actions were taken:
 - Define the disturbance area for the area of operation and sample the A horizon within this boundary for archaeological deposits. Use of heavy machinery would not be appropriate if significant deposits were present within the A horizon or plow zone (generally defined as the upper 20 centimeters of the soil column); this would include the traversing and setup area for demolition. Tracking mats or pads would be insufficient in such cases.
 - Assess the potential for impacting buried deposits on a case-by-case basis. Use of heavy equipment for demolition may be acceptable if buried deposits are present, but this would have to be assessed considering depth, type of deposits, and soil type. Tracking pads or mats could help prevent impacts in some areas. Use of heavy equipment for demolition would be acceptable if no significant deposits (other than possible isolated features) were present.
 - Survey adjacent to the buildings prior to ground-disturbing activities.
 - Survey beneath the buildings if ground-disturbing activities, such as foundation removal, are required.
 - Implement measures to ensure that features to remain in the cultural landscape, such as foundations and rock walls, will not be driven over or disturbed by construction equipment.

The National Park Service intends to develop comprehensive, scholarly historic contexts for Elkmont with input from professional scholar-advisors, conduct a comprehensive cultural landscape inventory, and prepare revised documentation for the National Register of Historic Places based on the new historic contexts, cultural landscape inventory, and other relevant research. The revised National Register documentation would more accurately reflect the resources that would remain, and would 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, would be completed.

2.10.1.2 *Mitigation Measures for Archeological Resources*

Appendix B provides impact mitigation recommendations for archeological resources. These include general recommendations for all building removal, restoration, rehabilitation, and reconstruction. The appendix then provides specific recommendations for

- individual parking areas
- road and bridge improvement
- water system improvements on a segment-by-segment basis
- sewer system improvements on a segment-by-segment basis

Table B-1 in the appendix presents detailed recommendations concerning individual buildings and groups of buildings.

Much of the Elkmont Historic District has been surveyed in association with past development in the vicinity, and in much of the area, no potentially significant resources were identified. In these areas, recommendations include no action or monitoring during construction. In unsurveyed areas, work is recommended to delineate and evaluate resources. In a few areas, deposits are considered potentially significant and additional evaluation is recommended prior to any ground-disturbing activities.

2.10.1.3 *Mitigation Measures for Historic Properties and Cultural Landscapes*

The Secretary's of the Interior's Standards for the Treatment of Historic Properties (The Secretary of the Interior 2005a) were included in the relevant laws and policies in Section 1.3. The Secretary of the Interior's guidelines for the treatment of cultural landscapes (*The Secretary of the Interior 2005b*) provide additional guidance on cultural landscapes. The alternatives for the management of the Elkmont Historic District propose treatments in conformance with these standards, which cover preservation, restoration, rehabilitation, and reconstruction of the historic buildings. In addition, the proposed treatments include preservation of the cultural landscape of the District, which was assessed by Cleveland (2004). The full text of the cultural and historic landscape report for the Elkmont Historic District is provided in Appendix D of this document.

In addition to the four treatments in the secretary's standards, the National Park Service has specific policies regarding reconstruction. Director's Order 28 (NPS 1998c) states that reconstruction is a last-resort measure for addressing a management objective and is only allowed with specific written approval of the NPS Director after a policy review at the NPS national office in Washington D.C. In addition to these requirements, *Management Policies 2006* (NPS 2006) states that the National Park Service will not reconstruct a missing structure unless:

- there is no alternative that would accomplish the park's interpretive mission
- sufficient data exists to enable its accurate reconstruction, based on the duplication of historic features substantiated by documentary or physical evidence, rather than on conjectural designs or features from other landscapes
- reconstruction will occur in the original location
- the disturbance or loss of significant archeological resources is minimized and mitigated by data recovery

The NPS Directorate permitted consideration of reconstruction of the Wonderland Hotel as an option in three alternatives to be assessed as part of the impact analysis because the hotel recently failed structurally and was removed. The Department of the Interior defines reconstruction as the act or process of depicting, by means of new construction, the form, features, and detailing of a non-surviving site, landscape, building, structure, or object for the purpose of replicating its appearance at a specific period of time and in its historic location.

Should reconstruction of the Wonderland Hotel occur, it would be conducted in accordance with *The Secretary's of the Interior's Standards for the Treatment of Historic Properties* (The Secretary of the Interior 2005a) and would comply with the standards for reconstruction (NPS 2004f) as follows:

- Reconstruction will be used to depict vanished or non-surviving portions of a property when documentary and physical evidence is available to permit accurate reconstruction with minimal conjecture, and such reconstruction is essential to the public understanding of the property.

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- Reconstruction of a landscape, building, structure, or object in its historic location will be preceded by a thorough archeological investigation to identify and evaluate those features and artifacts that are essential to an accurate reconstruction. If such resources must be disturbed, mitigation measures will be undertaken.
- Reconstruction will include measures to preserve any remaining historic materials, features and spatial relationships.
- Reconstruction will be based on the accurate duplication of historic features and elements substantiated by documentary or physical evidence rather than on conjectural designs or the availability of different features from other historic properties. A reconstructed property will re-create the appearance of the surviving historic property in materials, design, color, and texture.
- A reconstruction will be clearly identified as a contemporary re-creation.
- Designs that were never executed historically will not be constructed.

According to the secretary's standards, the goal of reconstruction is to make the building appear as it did at a particular and most significant time in its history. Remaining cultural landscape features should be retained to provide a sense of the historic setting. The use of traditional materials and finishes is always preferred for visible features. For non-visible features, such as interior structural or mechanical systems, it is expected that these will be contemporary upgrades, but that they will be obscured from view as much as possible. For interior spaces, the secretary's standards specify identifying, retaining, and preserving a floor plan or interior spaces that are important in defining the overall historic character of the building. This includes the size, configuration, proportion, and relationship of rooms and corridors; the relationship of features to spaces; and the spaces themselves.

The secretary's standards allow, but do not recommend, altering a floor plan or interior spaces that are important in defining the overall historic character of the building so that, as a result, the character is diminished. Any reconstruction proposed for the Wonderland Hotel under the proposed project alternatives would have to consider the secretary's standards and the spirit of the recommendations provided therein. Non-intrusive modifications to accommodate temperature and humidity controls, and other storage requirements of a curatorial facility may be required. The types of modifications necessary could include alteration of some of the interior layout of individual rooms.

2.10.2 Natural Resources Mitigation

All alternatives would include measures to avoid diminishing the value of resources or causing a direct loss of those resources. In compliance with natural resource management strategies for the Elkmont Historic District, all alternatives would do all of the following:

- protect streams, seeps, wetlands, and floodplains
- provide water resource management methods consistent with responsibilities outlined for Outstanding National Resource Waters
- protect federally-listed threatened or endangered species and their habitats
- protect high montane alluvial forest and its ability to regenerate
- avoid loss of habitat for the synchronous firefly population
- ensure that visitor use is maintained within the level that natural resources have the ability to sustain
- minimize areas of disturbance and maximize the use of previously disturbed areas

Some of the mitigation measures that would be employed by the National Park Service to achieve these conditions are described below.

The increase of non-native plant species is a result of disturbance-related activities. Therefore, Park personnel will perform non-native plant survey and eradication around buildings slated for removal, prior to removal activities.

To protect nesting and roosting habitat for birds and bats, tree removal to create access to a structure will be avoided from April 15 to October 15. If tree removal is required for safety reasons or to implement the building removal strategy, no trees larger than 6 inches in diameter at breast height will be removed without surveys of the exfoliating bark for bat species and canopy for nesting raptors.

Snags greater than 3 inches in diameter at breast height should be retained regardless of species. Exceptions for removal are those snags that may be potentially hazardous. Live tree and snag removal should be allowed only in instances where the tree poses a safety hazard in recreation, trails, or administrative use and roadway rights-of-way. All snags should be surveyed for use by bats or raptors before removal.

Tree limb and canopy damage shall be avoided or minimized. To prevent or minimize limb damage, the swing of hoists and buckets will be adjusted to avoid mid-canopy and upper-canopy branches and limbs.

Threatened, endangered and special concern species and their habitats will be avoided. A perimeter surrounding butternut trees will be fenced off at 1.5 times the maximum canopy drip line radius or beyond, if possible, to avoid impact to the tree trunk and limbs or potential soil compaction at the base. A perimeter surrounding Fraser's sedge will be fenced off at a radius of 10 meters from the plant population.

Setback distances will be included for work zones adjacent to waterways, wetlands, and floodplains. Setbacks for work adjacent to the Little River, its tributaries, 100-year floodplain, and delineated wetlands should follow buffer establishment guidelines, providing for a minimum 50-foot-radius buffer, which is increased by 2 feet for every 1 percent change in slope. No equipment shall be operated within this buffer, or within the waterways, 100-year floodplains, or wetlands. In addition, no materials shall be stored in these areas or vehicular traffic allowed, except on existing roads.

Impacts to bat populations that use the buildings or trees will be avoided. Eleven species of bats are found in the Park, including the little brown bat, northern long-eared bat, Indiana bat, eastern small-footed bat, big brown bat, evening bat, Rafinesque's big-eared bat, silver-haired bat, eastern pipistrelle, eastern red bat, and hoary bat. Although no threatened, endangered, or special concern bat species are known to occur in the Elkmont Historic District, bats have been observed within the buildings and potential habitat exists throughout the area.

The maternity season for several of these bat species begins in mid-April and young are flying by mid to late August. Roosting season is from April to September. Species known to roost in buildings include the little brown bat, northern long-eared bat, Indiana bat, eastern small-footed bat, big brown bat, evening bat, and Rafinesque's big-eared bat. Big brown bats can hibernate in buildings; other species of bats hibernate in caves or migrate to other locations. The silver-haired bat

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sometimes utilizes buildings during migration. Hibernation for bats within the Park is from October or November to the end of March.

Structure removal will only be permitted to occur between September 1 and April 1 of the calendar year. If at the time of removal, the most recent bat survey is more than two years old, a new bat survey will be required prior to removal activities. This study should be conducted in mid summer and should be carefully coordinated to avoid potential delays because of the September 1 to April 1 window for construction activities.

Disturbance of nesting bald eagles will be avoided. The nearest known location of nesting bald eagles is in the Fontana Lake area along the southern Park border. However, if a nest is located within any construction area, work within 800 meters of the nest should not begin until after August 31, with completion by December 31. Restricting work to this time period will avoid disruption during the breeding period for bald eagles.

Sites were selected for parking areas based on locations that would not intrude into the 100-year floodplain of the Little River or its tributaries, areas that had previous ground disturbance and/or contained little vegetation, and locations conducive to vehicular and pedestrian circulation. Parking areas were also sited to allow space for a vegetated buffer between the parking area and surface water.

A variety of surface treatments for parking areas were considered, including gravel, bituminous asphalt, conventional concrete, and pervious concrete. Selection of pavement material was based on its ability to contain the “first flush” of storm water runoff for pollutant capture, thereby minimizing the amount of storm water runoff that would reach surface waters. Only pervious concrete met the criterion of containing the first flush of storm water. Other advantages of pervious concrete include its exceptional strength and durability, and its ability to meet Architectural Barriers Act Accessibility Standards.

Pervious pavement allows water and oxygen to enter the soil surface below the concrete. It can reduce or eliminate the need for retention or detention ponds in areas surrounded by a vegetative buffer. Recent studies have shown that pervious pavement produces the best removal of pollutant loads, with greater than 80 percent removal of most contaminants in areas paved with pervious pavement surrounded by vegetative buffers (Rushton 2002). Minor maintenance is needed to ensure that pervious pavement retains its infiltration capacity and its pores do not become clogged with fine sediments tracked in on vehicle tires. Therefore, periodic pressure washing or vacuuming of pervious pavement would be necessary once every year or two, or as conditions require.

When preparing the wastewater projections for each alternative, the peak flow conditions were considered as more important than total daily wastewater flows. This approach provided greater treatment buffering capacity in the treatment plant and will better protect the Little River against unexpected wastewater flow conditions.

2.10.3 Construction Procedures and Protocols

Protocols have been developed by the National Park Service to avoid impacts to cultural and natural resources during removal, restoration, rehabilitation, and reconstruction of buildings. These measures would apply to all alternatives.

If machinery is used during removal of buildings, low-ground-pressure equipment must be employed for all work except hauling on existing roads. Low-ground-pressure equipment usually has a pressure impact of less than 2 pounds per square inch and can be custom built to fit most applications. It usually has wider tracks and a longer body than traditional equipment. Some low-ground-pressure equipment also has curved-end track pads to minimize damage to vegetation and the ground surface. However, low-ground-pressure equipment tracks may damage components of the cultural landscape and may not be suitable for use in rocky terrain. In these situations, rubber-tire vehicles with a telescoping hoist (such as a Gradall hydraulic excavator) and/or a combination of this type of equipment and tracking mats or pads should be used.

Any low-ground-pressure equipment used will require approval by Park management. Any equipment used during removal operations must also meet U.S. Department of the Interior standards related to transport of weedy plant material. At minimum, vehicles and equipment used in removal operations must be cleaned prior to arriving on site, including being washed clean and free of dirt and associated weed plant material.

Some road repairs may be necessary in association with the alternatives. Project implementation may result in accelerated deterioration of some of the existing infrastructure. Road repairs may be required following the implementation of this plan, and specific criteria for repair will be developed at that stage.

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2.11 ACTIONS ELIMINATED FROM FURTHER STUDY

Several actions suggested by other agencies or the public were not examined in this environmental impact statement. Consistent with Section 1502.14 of the Council on Environmental Quality (1978) regulations for implementing the National Environmental Policy Act, such actions must be identified, and reasons why they were eliminated should be provided.

Section 2.1.3 identified potential uses for the Elkmont Historic District that were eliminated from consideration, and provided the rationale for dismissing each use. That information is incorporated here by reference.

Other proposals addressed areas outside the Elkmont Historic District or dealt with the technical issue of the most appropriate approach for wastewater management. Summaries of those proposals and the reasons for their elimination are provided below.

2.11.1 Change Management of Elkmont Campground

Alterations to the campground and its associated buildings and facilities were not considered as part of any alternative in this analysis because the purpose of this analysis was to reevaluate the current management plan for the Elkmont Historic District buildings as specified in the Park's General Management Plan (NPS 1982). As a result, there will be no change in campground management from that outlined in the General Management Plan. In addition, no changes to modern Park buildings, such as those associated with the campground and Quarters 434 and 600, are proposed under any alternative. These buildings are not related to the Appalachian or Wonderland Clubs, were constructed after the District's designated period of significance, and would remain under all alternatives.

2.11.2 Wastewater Treatment

2.11.2.1 *Employ Individual Septic Collection with Subsurface Infiltration*

Conventional septic tanks and subsurface infiltration drain field technology was considered to serve individual buildings. However, the use of conventional septic systems would not be desirable because of the generally poor suitability of the soils throughout the District for these purposes. The use of individual, onsite disposal systems would have the same limitations, and could also result in a substantial amount of ground disturbance and the removal of trees and other vegetation with each installation. In addition, because woody vegetation over the drain field areas would be detrimental to the long-term effectiveness of the systems, the area would have to be maintained as grassland. For these reasons, this treatment option was dismissed from further consideration.

2.11.2.2 *Construct a Pressure Mound Disposal*

An elevated sand or soil mound would allow sewage disposal in areas where subsurface soil quality would not qualify for subsurface infiltration or drip irrigation. Effluent from the septic tank would be pumped through a dosing tank and then sprayed into a gravel bed within an elevated mound of

sand or soil. Primary and final treatment of the effluent would take place within the sand or soil of the mound and not within the surrounding soil.

Pressure mounds are not generally preferred methods of wastewater disposal for public facilities because they involve open-air treatment processes that are visible to the general public and are, therefore, much less aesthetically appealing. These facilities also are vulnerable to vandalism. For these reasons, this treatment option was dismissed from further consideration.

2.11.2.3 *Construct Holding Basins, Then Pump and Haul Wastewater to a Local Treatment Facility*

Under this option for wastewater management, the National Park Service would construct a gravity system to collect and convey wastewater to holding basins. A tank truck would periodically pump the sewage and transport it offsite to a regional wastewater treatment facility for treatment and disposal. The closest treatment facility is in Gatlinburg, Tennessee, approximately 10 miles from Elkmont.

This strategy is typically used when site conditions do not allow onsite treatment and disposal. Because the stored wastewater normally turns septic (anaerobic), the holding basins would require odor control measures such as chemical treatment or aeration. They also would have to be located in an area easily accessible by the sewage hauler. The Tennessee Department of Environment and Conservation has indicated that it would only permit pump-and -haul installations as a last resort and usually for a temporary period until other onsite wastewater treatment options could be implemented. For these reasons, this treatment option has been dismissed from further consideration.

2.11.2.4 *Construct a Pipeline to Convey Wastewater from Elkmont to Gatlinburg, Tennessee*

Under this approach, the volume of wastewater that exceeded the 35,000 gallons per day allowed for the Elkmont wastewater treatment facility would be piped to the existing Gatlinburg municipal system. This would involve constructing a pipeline from the Elkmont site, over Sugarland Mountain, and into Gatlinburg, a distance of 6 to 8 miles.

This pipeline would only be needed to service the Wonderland Hotel (if it was reconstructed), the Hotel Annex, and up to 20 cabins. A pipeline of this length would result in a large financial cost for this relatively small number of rooms and cabins. It also could create a substantial environmental impact over its 6- to 8-mile length, including extensive soil disturbance, removal of trees and other vegetation, and fragmentation of wildlife habitat. In some places, the road shoulder could be used for burying the pipeline to minimize environmental damage by using previously disturbed ground, but this approach would result in traffic disturbances, including partial road closures along the Little River Road and the road into Elkmont. This would substantially disrupt visitor access to this part of the Park during construction. In areas not adjacent to roads, there would be a relatively high probability for impacting cultural resources, including archeological and historic sites.

When considering the financial and environmental cost of such a system, compared to the relatively few rooms and cabins that this system would serve, it would not be a prudent undertaking. As a result, this option has been dismissed from further consideration.

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2.11.2.5 *Use Drip Irrigation for Wastewater Treatment*

A low-pressure, pump-and-piping system to distribute the wastewater into the soil through perforated, small-diameter, drip irrigation piping was considered. Such a drip irrigation / disposal system could be used to treat and dispose of the additional wastewater generated by alternatives that would exceed the design capacity of the existing wastewater treatment plant. However, the use of low-pressure, drip irrigation systems would not be desirable because of the generally poor suitability of the soils throughout the District, making it a challenge to locate a reliable, long-term location for such a system. As a result, if a drip irrigation / disposal system was installed to accommodate the wastewater treatment needs of an alternative, a suitable site for this system would have to be identified outside the District and is pending a determination as part of a separate, ongoing investigation. For the purposes of this Environmental Impact Statement, this option was dismissed from further consideration.

2.12 ENVIRONMENTALLY PREFERRED ALTERNATIVE

The Council on Environmental Quality regulations for implementing the National Environmental Policy Act requires that the record of decision specify an “environmentally preferred” alternative and an “agency preferred” alternative (40 *Code of Federal Regulations* 1505.2(b)). The National Park Service has identified Alternative C as its preferred alternative.

The environmentally preferred alternative is the alternative that would result in the least damage to the biological and physical environment, but that best protects, preserves, and enhances historic, cultural, and natural resources. The environmentally preferred alternative is determined by applying the following criteria from Section 101 of the National Environmental Policy Act to each alternative under consideration.

- 1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
- 2) assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings;
- 3) attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;
- 4) preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice;
- 5) achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and
- 6) enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Alternative C represents the environmentally preferred alternative for the Elkmont Historic District. This alternative emphasizes the preservation and protection of important historic, cultural and natural aspects of our national heritage while maintaining an environment that supports diversity and variety of individual choice. The proposed visitor facilities and services would have the least possible impact on resources while ensuring that visits to the site would take place in safe, healthful, productive and aesthetically and culturally pleasing surroundings. At the same time, Alternative C would achieve a balance between human population and resource considerations.

With regard to Section 101 of the National Environmental Policy Act, when considering all factors described in this analysis collectively, and seeking a management plan “in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony,” Alternative C was identified as the Environmentally Preferred Alternative. Alternative C “best protects, preserves and enhances cultural, historic and natural resources” in the Elkmont Historic District by causing “the least damage to the biological and physical environment.”

Alternative C would actively restore native plant communities in all locations where buildings would be removed and in areas previously impacted by human activity, providing for the long-term

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productivity of biotic resources. In particular, this alternative would provide a long-term benefit to the globally imperiled montane alluvial forest by allowing this resource to become reestablished in some areas and by directing human activity to areas that will not directly conflict with this resource.

Despite the substantial loss of historic buildings in the District, this alternative would retain, restore and preserve buildings and cultural landscape features listed in the National Register of Historic Places in the Appalachian Club portion of the District. The portion of the District in which cultural resources would be restored is at a size that would ensure an appropriate level of ongoing preservation without further burdening park operations. At the same time, Alternative C would achieve a wide range of visitor uses and opportunities for visitor understanding of natural and cultural resources. The retained cultural components and other resources within the District would be expected to accommodate visitation levels without experiencing major adverse impacts. A minor increase in visitation above current levels would occur as a result of implementing this alternative. Impacts to the Little River, listed as an Outstanding National Resource Water, would be negligible from both point and non-point pollution sources.

Long-term, moderate benefits to Park operations would be achieved because the current level of effort to maintain buildings in a stabilized state of repair would be greatly reduced, as would the level of patrol required and the safety hazards to the visiting public. Most impacts would be short-term and, with the exception of permanent impacts to contributing buildings that are removed, all other impacts would be minor to negligible.

It is important to note that while Alternative C was identified as the environmentally preferred alternative and best met several of the criteria, it was not always the alternative that best met all criteria. While some alternatives better met other individual criteria, when considered collectively, Alternative C best met all criteria. For purposes of comparing and contrasting the differences between project alternatives, the following discussion highlights how well each alternative would or would not achieve the requirements of section 101 of the National Environmental Policy Act. Details of each alternative regarding specific impacts by alternative are fully described in Chapter 4, Environmental Consequences.

1. Fulfill the responsibilities of each generation as a trustee of the environment for succeeding generations

When evaluating how each alternative would address the need and requirement to provide stewardship for the ongoing preservation of natural and cultural resources, it was determined that Alternative D2 best meets this criterion. Alternative D2 best meets this goal because it preserves and restores critical portions of the National Register listed historic district while at the same time preserving and restoring sensitive natural resources such as the montane alluvial forest and the water quality of the Little River. Alternative D2 also provides additional protection for Park cultural artifacts in the form of a curatorial facility that meets museum collection standards within the Park, an improvement over the existing conditions for these resources. Alternative C meets these same goals, but does not include a curatorial facility. Alternative B is similar to Alternative C, but preserves fewer cultural resources. Alternatives E1 and E2 provide greater protection for cultural resources, but at the expense of natural resources. Additionally, Alternative E2 could potentially adversely affect the water quality of the Little River due to the designation of this water body as an Outstanding Natural Resource Water and the associated wastewater generated by uses identified in this alternative. Alternatives F1 and F2 would provide the greatest protection for cultural resources by preserving nearly all of the historic district but at the same time would have the greatest adverse effects to natural resources, particularly the montane alluvial forest, other native plant communities, water quality, and air quality. Alternative A would provide the greatest protection for all natural resources, but at the expense of all cultural resources as little to nothing of the cultural environment would remain under this alternative. The No Action Alternative would also provide a very high level of protection for natural resources. While stone walls, chimneys and other stone structures would remain, providing a connection to the past inhabitants, nearly everything would be removed and the impacts to cultural resources would be nearly the same as in Alternative A.

2. Assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings

When evaluating how each alternative would provide a positive visitor experience for all visitors and at the same time maintain the safety and wellbeing of each visitor, it was determined that Alternative C best met this criterion because it would provide a positive visitor experience in an aesthetically and culturally pleasing surrounding for *all* Park visitors by providing both natural and cultural experiences in a relatively safe manner. Alternatives B, D1 and D2 were similar, but where B would provide a safer environment, it would lack some of the cultural experiences offered in Alternative D. Alternatives D1 and D2 would provide a unique cultural experience at the Wonderland Club, but with greater visitation and additional uses and activities at the Wonderland Club, would present greater challenges to providing a safe environment. While Alternative A would provide the safest environment for visitors and it would provide outstanding opportunities to experience a unique natural environment, this Alternative would essentially provide no opportunities for cultural resource experiences. Similarly, Alternatives E1 and E2 would provide excellent opportunities for cultural resource experiences as the majority of the district would be

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preserved, but visitors to the site would begin to experience feelings of crowding due to higher levels of visitation and the additional activities would present increased challenges to providing a safe environment. The No Action Alternative would provide links to the past culture of this area by retaining chimneys, stone walls and other stone structures in a natural environment as is the standard practice in Great Smoky Mountains National Park, but for all practical purposes, most all of the existing cultural resources would be removed. Because visitors would likely be intrigued by these stone structures, the primary safety concern related to the No Action Alternative would relate to issues surrounding the stability of stone chimneys and walls. While Alternative F1 and F2 would provide an almost completely restored and rehabilitated cultural resource environment, crowding and congestion would likely be extreme, creating adverse effects on the overall experience as well as creating many potentially unsafe situations. Additionally, Alternative F would create the most development within the site adversely impacting natural resources and opportunities to experience those resources in a natural setting.

3. Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences

Alternative C best met this criterion because this alternative would provide the widest range of beneficial uses in a sustainable and safe manner. When considering all alternatives, Alternative C would provide the greatest opportunities for the least amount of environmental degradation and safety concerns. Alternatives D1 and D2 would both provide a wider range of uses, but with a greater probability of environmental consequences and safety hazards. Alternative B would provide a decreased range of uses compared to Alternatives C, D1 and D2, but this would be offset by greater benefits to the environment due to the modest range of uses. The No Action Alternative and Alternative A would likely provide a high degree of sustainability, but this would be due to the extremely limited range of uses proposed. Alternatives E1 and E2 would provide even more uses, but with considerable environmental consequences, especially Alternative E2. While Alternatives F1 and F2 would have the greatest volume of use, these alternatives would not have the diversity of uses that Alternatives E1 and E2 would have and would create severe environmental consequences. Alternatives F1 and F2 would not be sustainable given the sensitive nature of this site.

4. Preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice

Alternatives C and D2 best meet this criterion because of the emphasis on the preservation and protection of important historic, cultural and natural aspects of this site while at the same time maintaining an environment that supports diversity and variety of individual choice. Alternative C would provide for greater preservation of natural resources while Alternative D2 would provide a greater diversity and variety of individual choices. Alternative D1 is similar to Alternative C regarding the provision of diversity and variety of individual choices, but would provide less preservation and protection of natural resources. Alternative E2 would provide less preservation of

important historic and cultural resources and would create an environment that supports diversity, and variety of individual choices, but adversely impacts important natural resources. Compared to Alternative E2, Alternative E1 would provide considerably fewer opportunities for diversity and variety of individual choices and fewer cultural resources, primarily because the Wonderland Hotel would not be reconstructed. Alternative B would provide good protection to natural resources and would offer limited diversity and variety of individual choices and would minimally preserve historic and cultural resources. Alternatives F1 and F2 would provide a high level of preservation for cultural resources, but would have highly detrimental effects on natural resources. Additionally, the diversity and variety of individual choice would be mostly limited to the commercial operation of the preserved buildings. The No Action Alternative and Alternative A would provide a high level of preservation for natural resources, but would preserve almost no historic and cultural resources. Additionally, the diversity and variety of individual choice would be mostly limited to the natural experiences.

5. Achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities

Alternatives C and D1 best meet this criterion because each of these alternatives would balance the preservation of important natural and cultural resources while at the same time providing ample access to these resources so that all visitors can enjoy them without experiencing feelings of crowding and at levels of use that are sustainable for the long-term preservation of those same resources. Alternative D2 provides greater resource use with the Wonderland Hotel complex being used for curatorial management of cultural resources but the associated impacts make this alternative less sustainable than Alternatives C or D1. While Alternative B provides for greater sustainability of natural resources, it is less balanced than Alternatives C, D1 and D2 because cultural resource experiences for visitors are limited due to the majority of those resources being removed. The No Action Alternative and Alternative A would provide a high level of sustainability for natural resources and opportunities for visitors to experience those amenities in a relatively pristine environment, but would not balance the use of all resources because most cultural resources would be removed under each of these alternatives. Alternative E2 would provide greater access and use to this site with additional cabins available for visitor overnight stays, but would not provide the best balance as proposed uses would adversely impact sensitive natural resources. Alternatives E2, F1 and F2 would provide the greatest level of access and use of cultural resources, but at the expense of many natural resources such as the montane alluvial forest, water resources and air quality and would therefore not provide a balanced approach for sustainable resource use. Additionally, the levels of visitor use under each of these alternatives would increase considerably causing problems with crowding and heavy use.

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6. Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources

Alternative A would best meet this criterion because the level of restoration efforts proposed would substantially improve the heavily impacted natural resources within this site. Additionally, because this previously developed site would be restored to a natural condition there would not be a need for electricity or water utilities for proposed activities. The No Action Alternative would similarly meet this criterion related to electricity and water use but with less emphasis on natural resource restoration. Alternatives B, C and D1 would require some use of electricity generated from non-renewable resources as facilities would make use of existing utilities and would also require water and wastewater service making these alternatives less desirable under this criterion than Alternative A. Alternative D2 would require greater power usage above that required for Alternative D1 because of the proposed curatorial facility. Alternatives E1, E2, F1 and F2 would each use increasing amounts of electricity and water above the previously mentioned alternatives due to the proposed overnight use of cabins for park visitors. Additionally, traffic into Elkmont would increase greatly under Alternatives E2, F1 and F2, and because access would be primarily by conventional petroleum powered automobiles, this would create a added demand on this non-renewable resource.

2.13 SUMMARIES

NPS guidance in *Director's Order #12 and Handbook: Conservation Planning, Environmental Impact Analysis, and Decision Making* (NPS 2001e) requires that environmental impact statements include summaries that will facilitate reader understanding. The important features of the alternatives are summarized in the following descriptions:

- Table 2-15: Proposed Disposition of Buildings by Alternative
- Table 2-16: Resource Education Components by Alternative
- Table 2-17: Alternative Summary by Attribute
- Table 2-18: Estimated Water Required and Wastewater Generated for All Alternatives
- Table 2-19: Proposed Water Supply System Improvements by Alternative
- Table 2-20: Proposed Wastewater System Improvements by Alternative
- Table 2-21: Proposed Road Improvements by Alternative
- Table 2-22: Summary of Impacts [This table provides a brief summary of the adverse and beneficial effects of each of the alternatives on the impact topics that are analyzed in Chapter 4. It also identifies the intensity of the effects (negligible, minor, moderate, or major), duration (short-term or long-term), geographic area of effect, and whether the effects would be direct or indirect.]

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Table 2-15: Proposed Disposition of Buildings by Alternative

Required Component	Alternative									
	No Action	A	B	C	D1	D2	E1	E2	F1	F2
Buildings Retained										
Daisy Town	None	None	12 cabins Appalachian Clubhouse	16 cabins Appalachian Clubhouse	16 cabins Appalachian Clubhouse	16 cabins Appalachian Clubhouse	16 cabins Appalachian Clubhouse	16 cabins Appalachian Clubhouse	16 cabins Appalachian Clubhouse	16 cabins Appalachian Clubhouse
Society Hill	None	None	None	1 cabin	1 cabin	1 cabin	1 cabin	1 cabin	23 cabins 1 garage 1 wood shed 1 privy	23 cabins 1 garage 1 woodshed 1 privy
Millionaire's Row	None	None	None	None	1 cabin	1 cabin	6 cabins 1 garage	6 cabins 1 garage	6 cabins 1 garage 1 gazebo	6 cabins 1 garage 1 gazebo
Wonderland Club	None	None	None	None	6 cabins	6 cabins Hotel Annex	7 cabins	7 cabins Hotel Annex	8 cabins 1 wood shed	8 cabins 1 wood shed Hotel Annex
Buildings Removed										
Daisy Town	All buildings removed: Appalachian Clubhouse 20 cabins 1 rear room	All buildings removed: Appalachian Clubhouse 20 cabins 1 rear room	8 cabins 1 rear room	4 cabins 1 rear room	4 cabins 1 rear room	4 cabins 1 rear room	4 cabins 1 rear room	4 cabins 1 rear room	4 cabins 1 rear room	4 cabins 1 rear room
Society Hill	25 cabins 1 garage 1 wood shed 1 privy	25 cabins 1 garage 1 wood shed 1 privy	25 cabins 1 garage 1 wood shed 1 privy	24 cabins 1 garage 1 wood shed 1 privy	24 cabins 1 garage 1 wood shed 1 privy	24 cabins 1 garage 1 wood shed 1 privy	24 cabins 1 garage 1 wood shed 1 privy	24 cabins 1 garage 1 wood shed 1 privy	2 cabins	2 cabins
Millionaire's Row	8 cabins 2 garages 1 gazebo	8 cabins 2 garages 1 gazebo	8 cabins 2 garages 1 gazebo	8 cabins 2 garages 1 gazebo	7 cabins 2 garages 1 gazebo	7 cabins 2 garages 1 gazebo	2 cabins 1 garage 1 gazebo	2 cabins 1 garage 1 gazebo	2 cabins 1 garage	2 cabins 1 garage

Table 2-15: Proposed Disposition of Buildings by Alternative (Continued)

Required Component	Alternative									
	No Action	A	B	C	D1	D2	E1	E2	F1	F2
Buildings Removed (continued)										
Wonderland Club	10 cabins 1 wood shed Wonderland Hotel and Annex	10 cabins 1 wood shed Wonderland Hotel and Annex	10 cabins 1 wood shed Wonderland Hotel and Annex	10 cabins 1 wood shed Wonderland Hotel and Annex	4 cabins 1 wood shed Wonderland Hotel and Annex	4cabins 1 wood shed	3 cabins 1 wood shed Wonderland Hotel and Annex	3 cabins 1 wood shed	2 cabins Wonderland Hotel and Annex	2 cabins
Wonderland Hotel										
Wonderland Hotel Removed	X	X	X	X	X	X	X	X	X	X
Wonderland Hotel Reconstructed						X		X		X
Appalachian Club Day Use			X	X	X	X	X	X	X	X

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Table 2-16: Resource Education Components by Alternative

Resource Education Component	Alternative									
	No Action	A	B	C	D1	D2	E1	E2	F1	F2
Orientation Area and Parking										
3-panel orientation kiosk across from hotel site containing area and park map.			x	x	x	x	x	x	x	x
Self-guiding brochure provided at orientation kiosk referenced to thematic stops at buildings and other cultural and natural resources throughout the District.			x	x	x	x	x	x	x	x
Wonderland Hotel										
(1) Wayside exhibit with two panels describing: <ul style="list-style-type: none"> The hotel and its role in travel and tourism to the District. The conflict between residents of the Elkmont community over whether to establish a national park or national forest. 			x	x	x		x		x	
(1) Wayside exhibit with two panels on reconstructed porch describing: <ul style="list-style-type: none"> The historic view of the hotel and a description of the scenic vista. Social life at Elkmont and the eventual establishment of the Park. 						x		x		x
Interior exhibits in lobby describing: <ul style="list-style-type: none"> The historic view of the hotel and a description of the scenic vista. Social life at Elkmont and the eventual establishment of the Park. 								x		x
Elkmont Campground										
(1) Wayside exhibit near existing vending machines with a historical description of the town of Elkmont.		x	x	x	x	x	x	x	x	x
Elkmont Nature Trail										
Revise trail brochure to include important natural and cultural history of the District, including: <ul style="list-style-type: none"> A description of the creation of the Park. History of Elkmont, including logging, significant natural features, and cultural remnants. 		x								
Revise trail brochure to include important natural history of the District, including: <ul style="list-style-type: none"> Description and significance of the montane alluvial forest. Description of important natural resource features along the trail. 			x	x	x	x	x	x	x	x

Table 2-16: Resource Education Components by Alternative (continued)

Resource Education Component	Alternative									
	No Action	A	B	C	D1	D2	E1	E2	F1	F2
Millionaire's Row										
(1) Wayside exhibit at Spence cabin (#42) describing Colonel Townsend's role in development of Elkmont.					x	x	x	x	x	x
(1) Wayside exhibit at Murphy cabin (#45) describing establishment and operation of the Little River Railroad.							x	x	x	x
Interior exhibits at Spence cabin describing: <ul style="list-style-type: none"> Importance of the structure relative to Elkmont's history. Establishment and operation of the Little River Lumber Company. 							x	x	x	x
(1) Wayside exhibit describing the natural history of the species of synchronous firefly in the District.		x	x	x	x	x	x	x	x	x
Society Hill										
(1) Wayside exhibit at the Chapman cabin (#38) describing Chapman's role in establishing the Park.				x	x	x	x	x	x	x
Daisy Town										
(1) Wayside exhibit at Mayo cabin (#7) describing District architectural features.			x							
(1) Wayside exhibit near the Daisy Town mailboxes describing the story of Park establishment.			x							
(1) Wayside exhibit providing an orientation to Daisy Town and a description of the District as a summer resort community.				x	x	x	x	x	x	x
(1) Wayside exhibit looking up the Daisy Town streetscape from the Appalachian Clubhouse providing a historical perspective on community life at Elkmont.			x	x	x	x	x	x	x	x
(1) Wayside exhibit near the Appalachian Clubhouse with building history.			x	x	x	x	x	x	x	x
(1) Wayside exhibit west of the Appalachian Club describing the history of the train station and railroad at Elkmont.			x	x	x	x	x	x	x	x
Interior exhibits in Appalachian Clubhouse serving as a self-guiding museum. Exhibits would add to the story provided by other interpretive exhibits.			x	x	x	x	x	x	x	x
Interpretive programs provided by National Park Service focusing on natural and cultural history themes of the area.					x	x				

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Table 2-17: Alternative Summary by Attribute

Required Component	Alternative									
	No Action	A	B	C	D1	D2	E1	E2	F1	F2
Number of cabins retained only for interpretive uses	0	0	12	17	18	18	17	17	17	17
Number of cabins retained for visiting scientist housing	0	0	0	0	6	6	6	6	0	0
Number of cabins retained for public lodging purposes	0	0	0	0	0	0	7	7	36	36
Number of interpretive exhibits	0	2	10	10	10	11	10	12	10	12
Upgraded electrical service required			X	X	X	X	X	X	X	X
Sprinkler systems (wet)			X	X	X	X	X	X	X	X
Sprinkler system (dry)						X				
Parking and Access*										
Orientation area (12 spaces; 720 square yards)			X	X						
Orientation area (25 spaces; 1,500 square yards)					X	X	X	X	X	X
Little River Trailhead (30 spaces; 1,800 square yards)			X	X	X	X	X	X	X	X
Appalachian Clubhouse (24 spaces; 1,440 square yards)			X	X	X	X	X	X	X	X
Daisy Town / Jakes Creek Trailhead (40 spaces; 2,400 square yards)			X	X	X	X	X	X		
Behind Wonderland Hotel (50 spaces; 3,000 square yards)						X		X		X
Wonderland Overflow (75 spaces; 4,500 square yards) (110 spaces in F2; 6,600 square yards)								X	X	X
Daisy Town (40 spaces; 2,400 square yards)									X	X
Gravel parking for Jakes Creek Trailhead in front of Kuhlman Cabin (20 spaces; 1,200 square yards)									X	X

Table 2-18: Estimated Water Required and Wastewater Generated for All Alternatives

Feature	Alternative									
	No Action	A	B	C	D1	D2	E1	E2	F1	F2
Daily average visitation projected (number of day use visitors, excluding public lodging and visiting scientists).	500	500	500	500	526	526	526	526	536	536
Number of visiting scientists housed in cabins.	0	0	0	0	18	18	22	22	0	0
Number of public lodging in cabins.	0	0	0	0	0	0	57	57	226	226
Water required for visiting scientists (gallons per day).	0	0	0	0	1,125	1,125	1,375	1,375	0	0
Water required for cabin public lodging (gallons per day).	0	0	0	0	0	0	4,275	4,275	16,950	16,950
Water for day use at Appalachian Clubhouse (gallons per day).	0	0	1,625	1,625	1,710	1,710	1,710	1,710	1,742	1,742
Number of lodgers in hotel and annex.	0	0	0	0	0	0	0	52	0	52
Water for Wonderland Hotel and Annex (gallons per day).	0	0	0	0	0	0	0	3,900	0	3,900
Water for restaurant at Wonderland Hotel (gallons per day).	0	0	0	0	0	0	0	5,000	0	5,000
Water for public restroom at Wonderland Hotel (gallons per day).	0	0	0	0	0	1,710	0	1,710	0	1,742
Total water required (gallons per day).	0	0	1,625	1,625	2,835	4,544	7,360	17,970	18,692	29,334
Total wastewater generated (gallons per day).	0	0	1,300	1,300	2,268	3,635	5,888	14,376	14,954	23,467

Values assume water demand is 1.25 x the amount of wastewater generated. Wastewater generated by visiting scientists = 50 gallons per day; public lodging visitors = 60 gallons per day; each visitor to the restaurant = 40 gallons per day, with maximum capacity (100) assumed for calculation of water requirements.

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Table 2-19: Proposed Water Supply System Improvements by Alternative

Proposed Improvement	Alternative									
	No Action	A	B	C	D1	D2	E1	E2	F1	F2
7,500 linear feet of 8-inch water line to Wonderland Club from existing Jakes Creek Cemetery water storage tanks, through campground, across Little River bridge and along Elkmont Road to rear of Wonderland Hotel.						X		X		X
7,500 linear feet of 6-inch water line to Wonderland Club from existing Jakes Creek Cemetery water storage tanks, through Campground, across Little River bridge and along Elkmont Road to rear of Wonderland Hotel.					X		X		X	
1,750 linear feet of 4-inch water line from the Appalachian Clubhouse, along Daisy Town Loop Road and Little River Road to Millionaire's Row cabins.							X	X	X	X
1,300 linear feet of 4-inch water line from existing Jakes Creek Cemetery water storage tanks, across Jakes Creek bridge and down Daisy Town Loop Road to Appalachian Clubhouse.			X	X	X	X	X	X	X	X
Water service lines from individual buildings to water main.					X	X	X	X	X	X
3,400 linear feet of 4-inch water line from Jakes Creek Cemetery water storage tanks, across Jakes Creek bridge and along Jakes Creek Road to Jakes Creek storage tank.									X	X
New water supply well and 1,150 linear feet of 4-inch piping located above Cambier cabin (#49) on Millionaire's Row with a water line connecting to water system near the cabin.							X	X	X	X
New booster pump station and well to supply water to Society Hill cabins.									X	X
Jakes Creek water storage tank rehabilitation with upgraded access road.									X	X

Table 2-20: Proposed Wastewater System Improvements by Alternative

Proposed Improvement	Alternative									
	No Action	A	B	C	D1	D2	E1	E2	F1	F2
640 linear feet of 8-inch gravity sewer line from Appalachian Clubhouse to existing manhole in Elkmont Campground (includes 40 linear feet of sewer line under Jakes Creek).			X	X	X	X	X	X	X	X
600 linear feet of 8-inch gravity sewer line along Catron Branch Road serving Wonderland Club cabins.					X	X	X	X	X	X
1,200 linear feet of 8-inch gravity sewer line along Jakes Creek Road and Daisy Town Loop Road to Appalachian Clubhouse serving Society Hill cabins.									X	X
4-inch gravity sewer service lines from individual cabins to sewer main for Wonderland Club cabins.					X	X	X	X	X	X
6-inch gravity sewer service lines for Wonderland Hotel and Annex.						X		X		X
4-inch gravity sewer service lines from individual cabins to sewer main for Society Hill cabins.									X	X
600 linear feet of 2-inch, low-pressure, sewer force main along Catron Branch Road serving Paine cabin in Wonderland Club.					X	X	X	X	X	X
2,400 linear feet of 3-inch, low-pressure, sewer force main from Appalachian Clubhouse along Daisy Town Loop Road and Little River Road serving Millionaire's Row cabins.							X	X	X	X
3,200 linear feet of 3-inch, low-pressure, sewer force main from rear of Wonderland area along Elkmont Road, across Little River bridge to existing sewer line in Elkmont Campground.					X	X	X	X	X	X
1,200 linear feet of 3-inch, low-pressure, sewer force main along Jakes Creek Road from Chapman cabin serving Kuhlman and McNabb cabins on Society Hill.									X	X
225-cubic-footflow equalization basin at the wastewater treatment plant (outside east side of existing fence).					X	X	X	X	X	X
Sewage pump station from Wonderland Club.					X	X	X	X	X	X
Grinder pumps behind cabins used for lodging.					X	X	X	X	X	X
5,000 gallons per day wastewater treatment expansion through drip irrigation system in a suitable location outside of the District or transport to Gatlinburg.								X	X	
15,000 gallons per day wastewater treatment expansion through drip irrigation system in a suitable location outside of the District or transport to Gatlinburg.										X

2.0 ALTERNATIVES

Table 2-21: Proposed Road and Path Improvements by Alternative

Proposed Improvement	Alternative									
	No Action	A	B	C	D1	D2	E1	E2	F1	F2
350 linear feet of second lane construction along Little River Road at Little River Trailhead Parking area in Millionaire's Row.			X	X	X	X	X	X	X	X
1,111 linear feet of asphalt repair / overlay down Daisy Town Loop Road between Jakes Creek Cemetery Road and Appalachian Clubhouse.			X	X	X	X	X	X	X	X
1,167 linear feet of one-lane road at Millionaire's Row to Cambier cabin.										
750 linear feet of two-lane asphalt road from Elkmont Road to rear of Wonderland Hotel.					X	X	X	X	X	X
350 linear feet of one-lane asphalt on Catron Branch Road from Wonderland parking lot to Beaman cabin.					X	X	X	X	X	X
300 linear feet of gravel overlay from existing road to Paine cabin.					X	X	X	X	X	X
500 linear feet of one-lane asphalt on Catron Branch Road from Beaman cabin to Richards cabin.									X	X
400 linear feet of one-lane road through orientation parking area across Elkmont Road.			X	X	X	X	X	X	X	X
New two-lane bridge over Little River to Wonderland overflow parking area.								X		X
550 linear feet of loop gravel walking path from Little River Trailhead to Spence cabin and returning to Little River Trail in Millionaire's Row.					X	X	X	X	X	X
550 linear feet of walking path from the orientation parking lot along the northern edge of Elkmont Road to the base of the hotel steps.			X	X	X	X	X		X	
800 linear feet of walking path from the orientation and Wonderland overflow parking lots along the northern edge of Elkmont Road to the base of the hotel steps.								X		X
400 linear feet of walking path from the base of the Wonderland steps in the vicinity of the historic walkway on the west side of the steps to the top of the Wonderland steps.			X	X		X		X		X
Relocate road gate on Little River Road to upper end of Millionaire's Row (at Cambier cabin).									X	X
Relocate road gate on Little River Road to east end of the Little River Trailhead parking area.			X	X	X	X	X	X		
Relocate gate or install new gate on Jakes Creek Road to just south of Jakes Creek Cemetery Road.			X	X	X	X	X	X		
Relocate gate on Jakes Creek road to just south of the proposed gravel parking area.									X	X
Stabilize bank at existing culverts.			X	X	X	X	X	X	X	X

Resource	ALTERNATIVE									
	No Action	A	B	C	D1	D2	E1	E2	F1	F2
Natural Resources										
Soils	Direct, Short-term, Negligible Adverse Effects during construction	Direct, Short-term, Negligible Adverse Effects during construction	Direct, Short-term, Minor and Moderate Adverse Effects during construction	Direct, Short-term, Moderate Adverse Effects during construction	Direct, Short-term, Moderate Adverse Effects during construction	Direct, Short-term, Moderate Adverse Effects during construction	Direct, Short-term, Moderate Adverse Effects during construction	Direct, Short-term, Moderate Adverse Effects during construction	Direct, Short-term, Moderate Adverse Effects during construction	Direct, Short-term, Moderate Adverse Effects during construction
			Direct, Long-term, Minor to Moderate, Adverse Effects due to the construction of four parking areas in previously disturbed and undisturbed sites (106 spaces)	Direct, Long-term, Minor to Moderate, Adverse Effects due to the construction of four parking areas in previously disturbed and undisturbed sites (106 spaces)	Direct, Long-term, Minor to Moderate, Adverse Effects due to the construction of four parking areas in previously disturbed and undisturbed sites (126 spaces)	Direct, Long-term, Minor to Moderate, Adverse Effects due to the construction of four parking areas in previously disturbed and undisturbed sites (176 spaces)	Direct, Long-term, Minor to Moderate, Adverse Effects due to the construction of four parking areas in previously disturbed and undisturbed sites (132 spaces)	Direct, Long-term, Minor to Major, Adverse Effects due to the construction of six parking areas in previously disturbed and undisturbed sites (256 spaces)	Direct, Long-term, Minor to Major, Adverse Effects due to the construction of six parking areas in previously disturbed and undisturbed sites (251 spaces)	Direct, Long-term, Minor to Major, Adverse Effects due to the construction of seven parking areas in previously disturbed and undisturbed sites (336 spaces)
	Indirect, Long-term, Major Beneficial Effects due to soil stabilization provided by the reestablishment of native plants and the elimination of impervious surfaces	Indirect, Long-term, Major Beneficial Effects due to soil stabilization provided by the reestablishment of native plants and the elimination of impervious surfaces	Indirect, Long-term, Minor and Moderate Beneficial Effects due to soil stabilization provided by the reestablishment of native plants and the elimination of impervious surfaces	Indirect, Long-term, Minor and Moderate Beneficial Effects due to soil stabilization provided by the reestablishment of native plants and the elimination of impervious surfaces	Indirect, Long-term, Negligible Beneficial Effects due to soil stabilization provided by the reestablishment of native plants and the elimination of impervious surfaces					
			Indirect, Long-term, Negligible Adverse Effects due to increased surface water runoff and erosion	Indirect, Long-term, Negligible Adverse Effects due to increased surface water runoff and erosion	Indirect, Long-term, Minor Adverse Effects due to increased surface water runoff and erosion	Indirect, Long-term, Moderate Adverse Effects due to increased surface water runoff and erosion	Indirect, Long-term, Moderate Adverse Effects due to increased impervious surfaces, surface water runoff, erosion and pedestrian traffic	Indirect, Long-term, Major Adverse Effects due to increased impervious surfaces, surface water runoff, erosion and pedestrian traffic	Indirect, Long-term, Moderate Adverse Effects due to increased impervious surfaces, surface water runoff, erosion and pedestrian traffic	Indirect, Long-term, Major Adverse Effects due to increased impervious surfaces, surface water runoff, erosion and pedestrian traffic
Water Quality	Indirect, Short-term, Negligible, Adverse Effects due to increased potential for excess runoff and sedimentation during construction	Indirect, Short-term, Negligible, Adverse Effects due to increased potential for excess runoff and sedimentation during construction	Indirect, Short-term, Negligible, Adverse Effects due to increased potential for excess runoff and sedimentation during construction	Indirect, Short-term, Negligible, Adverse Effects due to increased potential for excess runoff and sedimentation during construction	Indirect, Short-term, Negligible, Adverse Effects due to increased potential for excess runoff and sedimentation during construction	Indirect, Short-term, Negligible, Adverse Effects due to increased potential for excess runoff and sedimentation during construction	Indirect, Short-term, Minor, Adverse Effects due to increased potential for excess runoff and sedimentation during construction	Indirect, Short-term, Minor, Adverse Effects due to increased potential for excess runoff and sedimentation during construction	Indirect, Short-term, Minor, Adverse Effects due to increased potential for excess runoff and sedimentation during construction	Indirect, Short-term, Minor, Adverse Effects due to increased potential for excess runoff and sedimentation during construction
	Indirect, Long-term, Moderate Beneficial Effects due to increased area available for infiltration (Net Gain: 2.41 Acres)	Indirect, Long-term, Moderate Beneficial Effects due to increased area available for infiltration (Net Gain: 2.41 Acres)	Indirect, Long-term, Minor Beneficial Effects due to increased area available for infiltration (Net Gain: 0.74 Acres)	Indirect, Long-term, Minor Beneficial Effects due to increased area available for infiltration (Net Gain: 0.58 Acres)	Indirect, Long-term, Negligible Beneficial Effects due to increased area available for infiltration (Net Gain: 0.14 Acres)	Indirect, Long-term, Minor Adverse Effects due to increased impervious surfaces and net loss of area available for infiltration (Net Loss: 0.93 Acres)	Indirect, Long-term, Negligible Adverse Effects due to increased impervious surfaces and net loss of area available for infiltration (Net Loss: 0.06 Acres)	Indirect, Long-term, Moderate Adverse Effects due to increased impervious surfaces and net loss of area available for infiltration (Net Loss: 2.03 Acres)	Indirect, Long-term, Minor Adverse Effects due to increased impervious surfaces and net loss of area available for infiltration (Net Loss: 1.61 Acres)	Indirect, Long-term, Moderate Adverse Effects due to increased impervious surfaces and net loss of area available for infiltration (Net Loss: 3.18 acres)
			Indirect, Long-term, Negligible Adverse Effects due to increase in runoff	Indirect, Long-term, Negligible Adverse Effects due to increase in runoff	Indirect, Long-term, Minor Adverse Effects due to increase in runoff	Indirect, Long-term, Moderate Adverse Effects due to increase in runoff	Indirect, Long-term, Moderate Adverse Effects due to increase in runoff	Indirect, Long-term, Major Adverse Effects due to increase in runoff	Indirect, Long-term, Moderate Adverse Effects due to increase in runoff	Indirect, Long-term, Major Adverse Effects due to increase in runoff
			Direct, Long-term, Negligible, Adverse Effects due to the addition of 1,300 gpd into the existing system	Direct, Long-term, Negligible, Adverse Effects due to the addition of 1,300 gpd into the existing system	Direct, Long-term, Negligible, Adverse Effects due to the addition of 2,268 gpd into the existing system	Direct, Long-term, Negligible, Adverse Effects due to the addition of 3,635 gpd into the existing system	Direct, Long-term, Minor Adverse Effects due to the addition of 5,888 gpd into the existing system	Direct, Long-Term, Major Adverse Effects due to wastewater exceeding the 35,000 gpd limit	Direct, Long-Term, Major Adverse Effects due to wastewater exceeding the 35,000 gpd limit	Direct, Long-Term, Major Adverse Effects due to wastewater exceeding the 35,000 gpd limit

Resource	ALTERNATIVE									
	No Action	A	B	C	D1	D2	E1	E2	F1	F2
Terrestrial Communities	Direct, Short-term, Negligible Adverse Effects during construction due to use of heavy machinery	Direct, Short-term, Negligible Adverse Effects during construction due to use of heavy machinery	Direct, Short-term, Negligible Adverse Effects during construction due to use of heavy machinery	Direct, Short-term, Negligible Adverse Effects during construction due to use of heavy machinery	Direct, Short-term, Moderate Adverse Effects during construction due to use of heavy machinery	Direct, Short-term, Moderate Adverse Effects during construction due to use of heavy machinery	Direct, Short-term, Moderate Adverse Effects during construction due to use of heavy machinery	Direct, Short-term, Moderate Adverse Effects during construction due to use of heavy machinery	Direct, Short-term, Moderate Adverse Effects during construction due to use of heavy machinery	Direct, Short-term, Moderate Adverse Effects during construction due to use of heavy machinery
			Direct and Indirect, Long-term, Minor Adverse Effects due to increased hazard tree management	Direct and Indirect, Long-term, Minor Adverse Effects due to increased hazard tree management	Direct and Indirect, Long-term, Moderate Adverse Effects due to increased hazard tree management	Direct and Indirect, Long-term, Moderate Adverse Effects due to increased hazard tree management	Direct, Long-term, Major Adverse Effects Due to expansion of hazard tree management and other activities in Montane Alluvial Forest habitat	Direct, Long-term, Major Adverse Effects Due to expansion of hazard tree management and other activities in Montane Alluvial Forest habitat	Direct, Long-term, Major Adverse Effects Due to expansion of hazard tree management and other activities in Montane Alluvial Forest habitat	Direct, Long-term, Major Adverse Effects Due to expansion of hazard tree management and other activities in Montane Alluvial Forest habitat
	Direct and Indirect, Long-term, Major Beneficial Effects due to the potential for expansion of plant communities, including Montane Alluvial Forest (and wildlife habitat?)	Direct and Indirect, Long-term, Major Beneficial Effects due to the potential for expansion of plant communities, including Montane Alluvial Forest (and wildlife habitat?) and the elimination of invasive, non-natives	Direct and Indirect, Long-term, Major Beneficial Effects due to the potential for expansion of plant communities, including Montane Alluvial Forest (and wildlife habitat?)	Direct and Indirect, Long-term, Major Beneficial Effects due to the potential for expansion of plant communities, including Montane Alluvial Forest (and wildlife habitat?)	Direct and Indirect, Long-term, Moderate Beneficial Effects due to the potential for expansion of plant communities	Direct and Indirect, Long-term, Moderate Beneficial Effects due to the potential for expansion of plant communities				
					Indirect, Long-term, Moderate Adverse Effects due to increased visitation and use	Indirect, Long-term, Moderate Adverse Effects due to increased visitation and use	Indirect, Long-term, Major Adverse Effects due to the loss of plant communities, the potential for chronic disturbance, increased traffic and visitation	Indirect, Long-term, Major Adverse Effects due to the loss of plant communities, the potential for chronic disturbance, increased traffic and visitation	Indirect, Long-term, Major Adverse Effects due to the loss of plant communities, the potential for chronic disturbance, increased traffic and visitation	Indirect, Long-term, Major Adverse Effects due to the loss of plant communities, the potential for chronic disturbance, increased traffic and visitation
Aquatic Communities	Direct, Short-term, Negligible, Adverse Effects during construction due to use of heavy machinery and increased erosion potential	Direct, Short-term, Negligible, Adverse Effects during construction due to use of heavy machinery and increased erosion potential	Direct, Short-term, Negligible, Adverse Effects during construction due to use of heavy machinery and increased erosion potential	Direct, Short-term, Negligible, Adverse Effects during construction due to use of heavy machinery and increased erosion potential	Direct, Short-term, Negligible, Adverse Effects during construction due to use of heavy machinery and increased erosion potential	Direct, Short-term, Negligible, Adverse Effects during construction due to use of heavy machinery and increased erosion potential	Direct, Short-term, Negligible, Adverse Effects during construction due to use of heavy machinery and increased erosion potential	Direct, Short-term, Negligible, Adverse Effects during construction due to use of heavy machinery and increased erosion potential	Direct, Short-term, Negligible, Adverse Effects during construction due to use of heavy machinery and increased 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 the increase in soil stabilization and reduced erosion potential	Indirect, Long-term, Minor Beneficial Effects due to the increase in soil stabilization and reduced erosion potential	Indirect, Long-term, Minor Beneficial Effects due to the increase in soil stabilization and reduced erosion potential	Indirect, Long-term, Minor Beneficial Effects due to the increase in soil stabilization and reduced erosion potential	Indirect, Long-term, Minor Adverse Effects due to increased impermeable surfaces, runoff into surface waters and potential for deposition of petrochemicals into adjacent waterways	Indirect, Long-term, Minor Adverse Effects due to increased impermeable surfaces, runoff into surface waters and potential for deposition of petrochemicals into adjacent waterways	Indirect, Long-term, Minor Adverse Effects due to increased impermeable surfaces, runoff into surface waters and potential for deposition of petrochemicals into adjacent waterways	Indirect, Long-term, Minor Adverse Effects due to increased impermeable surfaces, runoff into surface waters and potential for deposition of petrochemicals into adjacent waterways	Indirect, Long-term, Minor Adverse Effects due to increased impermeable surfaces, runoff into surface waters and potential for deposition of petrochemicals into adjacent waterways	Indirect, Long-term, Minor Adverse Effects due to increased impermeable surfaces, runoff into surface waters and potential for deposition of petrochemicals into adjacent waterways Note-CBA identified additional impacts not captured in text

Resource	ALTERNATIVE									
	No Action	A	B	C	D1	D2	E1	E2	F1	F2
Federal and State Threatened, Endangered, Sensitive and Rare Species and Species of Concern	No Direct Effect to Federally Listed Species	No Direct Effect to Federally Listed Species	No Direct Effect to Federally Listed Species	No Direct Effect to Federally Listed Species	No Direct Effect to Federally Listed Species	No Direct Effect to Federally Listed Species	No Direct Effect to Federally Listed Species	No Direct Effect to Federally Listed Species	No Direct Effect to Federally Listed Species	No Direct Effect to Federally Listed Species
	Indirect, Long-term, Minor Beneficial Effects to Federally Listed Species by expanding and improving potential habitat (fix text)	Indirect, Long-term, Minor Beneficial Effects to Federally Listed Species by expanding and improving potential habitat (fix text)	Indirect, Long-term, Minor Beneficial Effects to Federally Listed Species by expanding and improving potential habitat (fix text)	Indirect, Long-term, Minor Beneficial Effects to Federally Listed Species by expanding and improving potential habitat (fix text)	Indirect, Long-term, Negligible Beneficial Effects to Federally Listed Species by expanding and improving potential habitat (fix text)	Indirect, Long-term, Negligible Beneficial Effects to Federally Listed Species by expanding and improving potential habitat (fix text)				
	Direct, Short-term, Negligible Adverse Effects to State Listed Species during construction	Direct, Short-term, Negligible Adverse Effects to State Listed Species during construction	Direct, Short-term, Negligible Adverse Effects to State Listed Species during construction	Direct, Short-term, Negligible Adverse Effects to State Listed Species during construction	Direct, Short-term, Negligible Adverse Effects to State Listed Species during construction	Direct, Short-term, Negligible Adverse Effects to State Listed Species during construction	Indirect, Short-term, Minor Adverse Effects to State Listed Species during construction	Indirect, Short-term, Minor Adverse Effects to State Listed Species during construction	Indirect, Short-term, Minor Adverse Effects to State Listed Species during construction	Indirect, Short-term, Minor Adverse Effects to State Listed Species during construction
	Indirect, Long-term, Minor Beneficial Effects to State Listed Species due to expansion of potential habitat	Indirect, Long-term, Minor Beneficial Effects to State Listed Species due to expansion of potential habitat	Indirect, Long-term, Minor Beneficial Effects to State Listed Species due to expansion of potential habitat	Indirect, Long-term, Minor Beneficial Effects to State Listed Species due to expansion of potential habitat	Indirect, Long-term, Negligible Beneficial Effects to State Listed Species due to expansion of potential habitat	Indirect, Long-term, Negligible Beneficial Effects to State Listed Species due to expansion of potential habitat				
					Indirect, Long-term, Minor Adverse Effects to State Listed Species due to elevated potential for trampling from increased visitation	Indirect, Long-term, Minor Adverse Effects to State Listed Species due to elevated potential for trampling from increased visitation	Indirect, Long-term, Minor Adverse Effects to State Listed Species due to elevated potential for trampling from increased visitation	Indirect, Long-term, Minor Adverse Effects to State Listed Species due to elevated potential for trampling from increased visitation	Indirect, Long-term, Minor Adverse Effects to State Listed Species due to elevated potential for trampling from increased visitation	Indirect, Long-term, Minor Adverse Effects to State Listed Species due to elevated potential for trampling from increased visitation
							Indirect, Long-term, Moderate Adverse Effects to existing and potential habitat	Indirect, Long-term, Moderate Adverse Effects to existing and potential habitat	Indirect, Long-term, Moderate Adverse Effects to existing and potential habitat	Indirect, Long-term, Moderate Adverse Effects to existing and potential habitat
Wetland Communities and Functional Values	Direct, Short-term, Minor Adverse Effects during construction	Direct, Short-term, Minor Adverse Effects during construction	Direct, Short-term, Minor Adverse Effects during construction	Direct, Short-term, Minor Adverse Effects during construction	Direct, Short-term, Minor Adverse Effects during construction	Direct, Short-term, Minor Adverse Effects during construction	Direct, Short-term, Minor Adverse Effects during construction	Direct, Short-term, Minor Adverse Effects during construction	Direct, Short-term, Minor Adverse Effects during construction	Direct, Short-term, Minor Adverse Effects during construction
	Indirect, Long-term, Moderate Beneficial Effects due to removal of buildings adjacent to wetlands, increases in flood storage, fish and shellfish habitat, recreation, wildlife habitat and improved aesthetics/visual quality functions	Indirect, Long-term, Moderate Beneficial Effects due to removal of buildings adjacent to wetlands, increases in flood storage, fish and shellfish habitat, recreation, wildlife habitat and improved aesthetics/visual quality functions					Indirect, Long-term, Minor Adverse Effects due to retention of buildings and paving of parking areas adjacent to wetlands Wetland functions would be diminished	Indirect, Long-term, Minor Adverse Effects due to retention of buildings and paving of parking areas adjacent to wetlands Wetland functions would be diminished	Indirect, Long-term, Minor Adverse Effects due to retention of buildings and paving of parking areas adjacent to wetlands Wetland functions would be diminished	Indirect, Long-term, Minor Adverse Effects due to retention of buildings and paving of parking areas adjacent to wetlands Wetland functions would be diminished
			Indirect, long-term, negligible adverse due to adjacent pavement	Indirect, long-term, negligible adverse due to adjacent pavement	Indirect, long-term, negligible adverse due to adjacent pavement	Indirect, long-term, negligible adverse due to adjacent pavement				

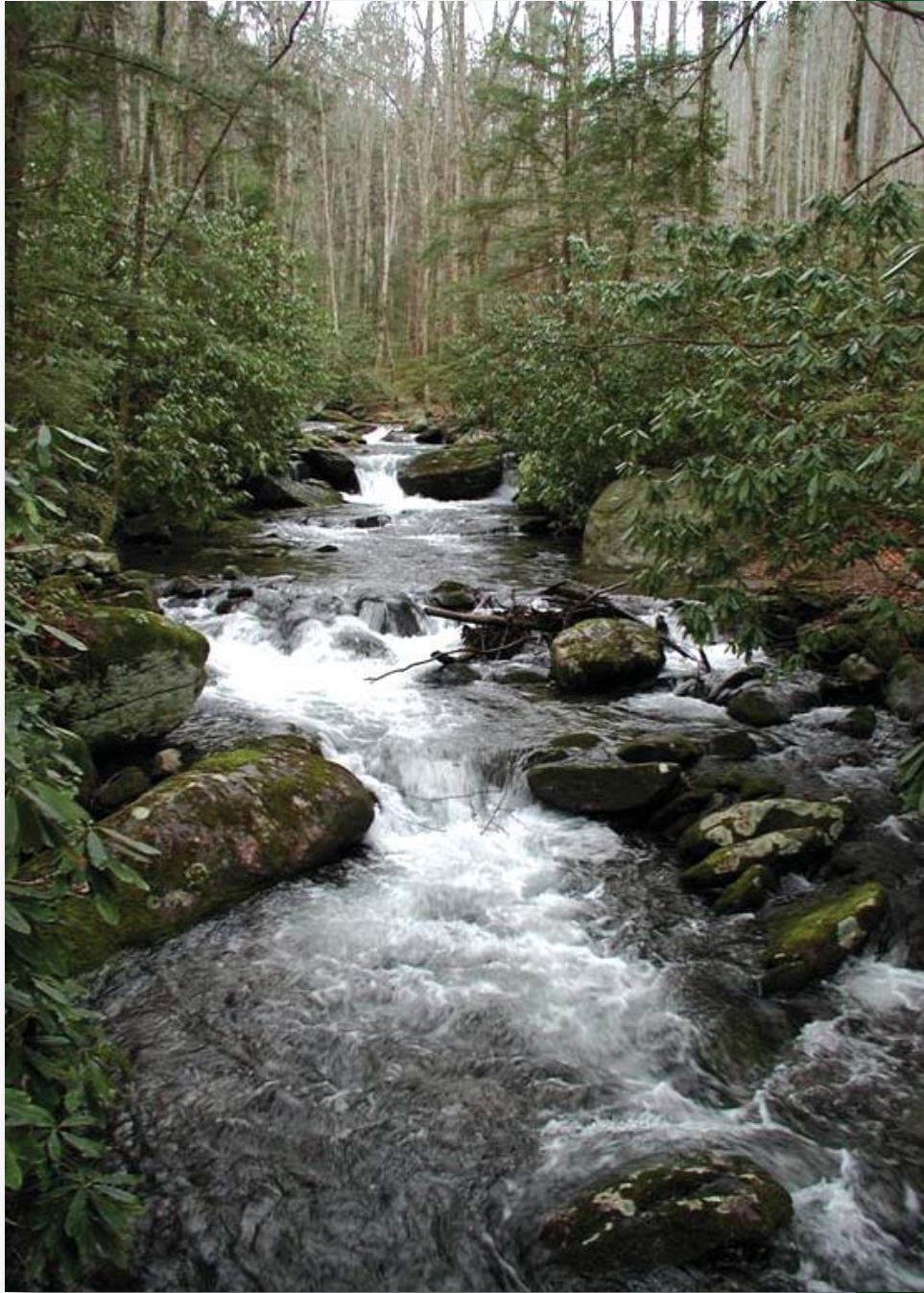
Resource	ALTERNATIVE									
	No Action	A	B	C	D1	D2	E1	E2	F1	F2
Floodplains	No Direct Adverse Effects	No Direct Adverse Effects	No Direct Adverse Effects	No Direct Adverse Effects	No Direct Adverse Effects	No Direct Adverse Effects	Direct, Short-term, Minor Adverse Effects during construction	Direct, Short-term, Minor Adverse Effects during construction	Direct, Short-term, Minor Adverse Effects during construction	Direct, Short-term, Minor Adverse Effects during construction
	Direct and Indirect, Long-term, Minor, Moderate and Major Beneficial Effects due to the removal of buildings from the floodplain, the elimination of future ground disturbance and soil compaction and the reestablishment of floodplain forest communities	Direct and Indirect, Long-term, Minor, Moderate and Major Beneficial Effects due to the removal of buildings from the floodplain, the elimination of future ground disturbance and soil compaction and the reestablishment of floodplain forest communities	Direct and Indirect, Long-term, Minor, Moderate and Major Beneficial Effects due to the removal of buildings from the floodplain, the elimination of future ground disturbance and soil compaction and the reestablishment of floodplain forest communities	Direct and Indirect, Long-term, Minor, Moderate and Major Beneficial Effects due to the removal of buildings from the floodplain, the elimination of future ground disturbance and soil compaction and the reestablishment of floodplain forest communities	Direct and Indirect, Long-term, Minor, Moderate and Major Beneficial Effects due to the removal of buildings from the floodplain, the elimination of future ground disturbance and soil compaction and the reestablishment of floodplain forest communities	Direct and Indirect, Long-term, Minor, Moderate and Major Beneficial Effects due to the removal of buildings from the floodplain, the elimination of future ground disturbance and soil compaction and the reestablishment of floodplain forest communities	Indirect, Long-term, Minor and Moderate Adverse Effects due to the retention of buildings within and adjacent to the floodplain	Indirect, Long-term, Minor and Moderate Adverse Effects due to the retention of buildings within and adjacent to the floodplain	Indirect, Long-term, Minor and Moderate Adverse Effects due to the retention of buildings within and adjacent to the floodplain	Indirect, Long-term, Minor and Moderate Adverse Effects due to the retention of buildings within and adjacent to the floodplain
							Direct and Indirect, Long-term, Negligible Beneficial Effects due to the removal of two buildings located within the Floodplain	Direct and Indirect, Long-term, Negligible Beneficial Effects due to the removal of two buildings located within the Floodplain	Direct and Indirect, Long-term, Negligible Beneficial Effects due to the removal of two buildings located within the Floodplain	Direct and Indirect, Long-term, Negligible Beneficial Effects due to the removal of two buildings located within the Floodplain
Air Quality	Direct, Short-term, Negligible Adverse Effects during construction	Direct, Short-term, Negligible Adverse Effects during construction	Direct, Short-term, Negligible Adverse Effects during construction	Direct, Short-term, Negligible Adverse Effects during construction	Direct, Short-term, Negligible Adverse Effects during construction	Direct, Short-term, Negligible Adverse Effects during construction	Direct, Short-term, Negligible Adverse Effects during construction	Direct, Short-term, Negligible Adverse Effects during construction	Direct, Short-term, Negligible Adverse Effects during construction	Direct, Short-term, Negligible Adverse Effects during construction
	No Long-term Direct or Indirect Effects NOx = 50.37 tons/year VOCs = 72.64 tons/year	No Long-term Direct or Indirect Effects NOx = 50.37 tons/year VOCs = 72.64 tons/year	No Long-term Direct or Indirect Effects NOx = 50.37 tons/year VOCs = 72.64 tons/year	No Long-term Direct or Indirect Effects NOx = 50.37 tons/year VOCs = 72.64 tons/year	Indirect, Long-term, Minor, Adverse Effects NOx = 53.29 tons/year VOCs = 76.65 tons/year	Indirect, Long-term, Minor, Adverse Effects NOx = 53.29 tons/year VOCs = 76.65 tons/year	Indirect, Long-term, Major, Adverse Effects NOx = 56.94 tons/year VOCs = 82.13 tons/year	Indirect, Long-term, Major, Adverse Effects NOx = 56.94 tons/year VOCs = 82.13 tons/year	Indirect, Long-term, Major, Adverse Effects NOx = 58.40 tons/year VOCs = 83.95 tons/year	Indirect, Long-term, Major, Adverse Effects NOx = 58.40 tons/year VOCs = 83.95 tons/year

[illegible]

[illegible]

Affected Environment

3



3.0 AFFECTED ENVIRONMENT

3.1 CULTURAL RESOURCES

This section presents a brief overview of the cultural history of the Elkmont Historic District and a description of the District's cultural resources. Much of the information in this section is taken from

- the 1993 National Register of Historic Places nomination form for Elkmont (Thomason *et al.* 1993)
- the 2002 report *Cultural Resources of the Elkmont Historic District, Great Smoky Mountains National Park, Sevier County, Tennessee* (Cleveland *et al.* 2002)
- follow-up cultural resource investigations conducted in 2003 and 2004 to provide additional information for use in impact analysis (Webb and Benyshek 2004)

The cultural resources of the District are of three primary types: prehistoric and historic archeological resources, which consist of below-ground evidence of human occupation; historic buildings; and other structures and cultural landscape features.

3.1.1 Site Prehistory and History

3.1.1.1 *Environmental Setting*

The current environmental setting of the District is described in Section 3.2 of this document. However, to facilitate an understanding of the cultural history, it is important to understand the environmental setting and climate before and during human settlement.

The Elkmont Historic District is located in a mountain valley and on adjacent slopes of the Appalachian Summit region in the Southern Blue Ridge physiographic province. It is characterized by rugged terrain, heavily forested slopes, and rushing streams with waterfalls.

Today, the climate of the District is humid and temperate. Temperatures were considerably colder in the southeast during the last glacial period (about 23,000 to 13,000 years before present), and the landscape was covered with a boreal, northern coniferous forest dominated by pines and spruce. When the first known humans arrived in North America (about 18,000-13,000 years before present.), the climate had warmed, precipitation had increased, and the forest overstory at the lower elevations was composed of northern hardwood trees. From 6,000 to 3,000 years before present, another climate change occurred, referred to as the Hypsithermal, which is generally considered a period of continued warming and, possibly, less precipitation. Since that time, the climate has cooled somewhat, allowing for conditions that support different vegetation zones at various elevations.

Currently, a variety of forest types are found in the District and are dominated by white pine, eastern hemlock, oak species, hickory, and tulip tree. In addition, some areas include montane alluvial forest, a temporarily flooded, cold-deciduous forest typically found on mid-elevation mountainous floodplains. Elkmont represents a higher elevation variant of this forest type.

3.0 AFFECTED ENVIRONMENT

Montane alluvial forest is a relatively rare forest type because of the scarcity of well developed, broad floodplains in mountainous regions. This forest type is also rare because many floodplains in the region have been converted to agricultural areas or developed for other uses. Cove mixed hardwoods and oak hardwoods are often found on the adjacent slopes. Throughout the period of human occupation, the range of vegetation found in each of these forest types provided diverse habitats and supported a variety of wildlife species, including white-tailed deer, black bear, bobcat, gray fox, beaver, otter, several squirrel species, turkey, and fish. Complete descriptions of current vegetation communities of the District are provided in Section 3.2.2 of this document.

3.1.1.2 Prehistoric Overview

Human occupation in the Appalachian Summit is divided into seven chronological periods: Pre-PaleoIndian (40,000 to 11,500 years before present), PaleoIndian Period (11,500 to 10,000 years before present), Archaic (10,000 to 3000 years before present), Woodland Period (3000 to 1000 years before present), Mississippian Period (1000 to 550 years before present), Historic Cherokee (1450 A.D. to 1838 A.D.), and Euro-American (1750 to present). Table 3-1 illustrates the generalized cultural chronology of the Elkmont area. Human occupation in this region is evidenced by technology, settlement patterns, subsistence practices, population density, social organization, ideology, and other cultural components.

Pre-PaleoIndian and PaleoIndian Periods. Documented human settlement is known from prior to 12,000 years before present elsewhere in the eastern United States, but none of these earliest Pre-PaleoIndian human occupations have been found in the Appalachian Summit. Research in the southeastern part of the country has revealed evidence of human occupation from about 11,500 years before present. While evidence of PaleoIndians has been found in Tennessee, there is sparse distribution of their remains in the Appalachian Summit. To date, no evidence of PaleoIndian culture has been found within the District.

Archaic Period. The Archaic period in the Appalachian Summit can be divided into three subperiods: Early (10,000 to 8000 years before present), Middle (8000 to 5000 years before present) and Late (5000 to 3000 years before present). These divisions are largely recognized and based on temporal changes in style of projectile points. Both Middle and Late Archaic site components have been found within the District.

Woodland Period. The Woodland period in the Appalachian Summit is divided into three subperiods: Early (3000 to 2500 years before present), Middle (2500 to 1500 years before present) and Late (1500 to 1000 years before present). The Woodland period most likely marks a gradual transition in both subsistence and settlement patterns because a deciduous forest environment, similar to that found in the Archaic period, was exploited. Tools introduced in the Archaic period, such as drills, wedges, hoes, nutting stones, pestles, and awls, also appear in the archeological record of the Woodland period. The Woodland period in the Appalachian Summit is marked by the beginnings of pottery making and the introduction of the bow and arrow. No Early or Late Woodland occupations are known from the District, but evidence of Middle Woodland occupations has been found at two locations.

Table 3-1: Generalized Cultural Chronology for the Elkmont Historic District and Appalachian Summit Region

Period	Phase or Subperiod	Chronology	Comments
Euro-American	Great Smoky Mountains National Park	1930s to present	Development of Elkmont Campground and other facilities.
	Resort era (Elkmont)	about 1910 to 1934	Development of Wonderland Club, the Appalachian Club, and resort cabins.
	Railroad logging	about 1908 to 1926	Intensive Little River Lumber Company logging of East Prong Little River; beginning of development of town of Elkmont.
	Settlement	1800s to 1830s	Ownby, Trentham, and other occupations along Little River and Jakes Creek.
	Exploration and early settlement	about 1750 to 1800	Early exploration; no known occupation of Elkmont area.
Historic Cherokee	Late Qualla	about A.D. 1650 to 1838	
	Early/Middle Qualla	about A.D. 1450 to 1650	
Mississippian	Mississippian I (Tennessee)/ Pisgah (North Carolina)	1000 to 550 years before present	
Late Woodland	Undifferentiated	1500 to 1000 years before present	Possible Late Woodland manifestations include Hamilton, Cane Creek, and late Connestee materials.
Middle Woodland	Connestee	1800 to 1500 years before present	Continues into Late Woodland period.
	Woodland II (Tennessee)/ Pigeon (North Carolina)	2200 to 1600 / 2500 to 1800 years before present	Elkmont Sites 40SV120, 40SV166.
Early Woodland	Woodland I (Tennessee)/ Swannanoa (North Carolina)	2900 to 2200 / 3000 to 2500 years before present	
Late Archaic	Savannah River	5000 to 3000 years before present	Elkmont Site 40SV125.
Middle Archaic	Guilford	6000 to 5000 years before present	
	Morrow Mountain	7500 to 6000 years before present	Elkmont Site 40SV125.
	Stanly	8000 to 7500 years before present	
Early Archaic	LeCroy	8900 to 8000 years before present	
	Kirk	10,000 to 8900 years before present	
PaleoIndian	Late	10,500 to 10,000 years before present	
	Middle	10,900 to 10,500 years before present	
	Early	11,500 to 10,900 years before present	
Pre-PaleoIndian		40,000 to 11,500 years before present	Hypothesized early occupation of Eastern North America.

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Mississippian Period. The Mississippian period has been the subject of much research throughout the southeastern United States. In the eastern part of the Appalachian Summit, this period is marked by the Pisgah phase (1000 to 550 years before present), but it is currently believed that the Pisgah phase did not make a significant cultural impact in the North Carolina or Tennessee mountains west of the Tuckasegee drainage. It has been suggested that an early Qualla (Historic Cherokee or Lamar) phase culture was thriving at about the same time that Pisgah influence was being felt in the central part of the Appalachian Summit. Other Mississippian manifestations are present in the Tennessee and Little Tennessee valleys west and southwest of Elkmont, including the Hiwassee Island and Dallas phases.

3.1.1.3 Historic Overview (Euro-American, 1750 to present)

Historic Cherokee. The Cherokee Indians occupied the Appalachian Summit region at the time of the earliest European exploration (Hernando de Soto's expedition in 1540) and had likely been resident in the area since at least the mid-15th century. The historic Cherokee occupation is known archeologically as the Qualla phase (about A.D. 1450 to 1838) and can be divided into earlier (about A.D. 1450 to 1650) and later (about A.D. 1650 to 1838) periods. The late Qualla phase (about A.D. 1650 to 1838) is marked by the increasing appearance of European goods at Cherokee sites, as well as shifts from typical Mississippian structure forms to more Euro-American style architecture.

The settlement pattern for this phase changed during the latter part of the 18th century from nucleated towns or villages to one characterized by loosely grouped houses, usually set in a linear pattern. By the early 19th century, most Cherokees were living in Euro-American-style log cabins. Late Qualla ceramics are generally similar to those of the early Qualla phase, although there are significant differences in the representation of specific vessel forms and decorative motifs. European-made items like glass trade beads, iron tools and utensils, guns, glass bottles, and copper kettles were introduced into the artifact assemblage.

Euro-American, 1750–Present. Late-18th century Euro-American settlements in Sevier County and the rest of east Tennessee generally were located on the flat, accessible lands along the main rivers and larger creeks. Several fortified homesteads, or “stations,” were established in the area during this period, primarily along the larger drainages. Sevier County was established in 1785, and in 1795, the county seat was moved to Sevierville.

Settlement of the more mountainous interior of the region, including Elkmont, did not begin until well into the 19th century. By the 1830s, the Ownby and Trentham families owned and farmed land along Jakes Creek in Elkmont.

Elkmont was important to both the railroad and lumbering operations of the area. The history of logging on the East Prong of the Little River (which includes the District) follows the pattern seen elsewhere in the Smoky Mountains. The earliest logging occurred between about 1880 and 1900, and was characterized by selective cutting in areas most easily reached by the logger. Early logging near Elkmont apparently focused on poplar and ash, but also included some cutting of cherry and basswood. In the early 1900s, ox teams were used to log portions of the Blanket Creek and Jakes Creek drainages. Soon thereafter, the railroad at Elkmont began to take the place of ox teams in transporting harvested lumber from the area.

Large-scale railroad (or mechanical) logging began in the Elkmont area in the early 1900s, when the Little River Lumber Company began to purchase property in the vicinity. The company built a large band mill at Townsend, in Tuckaleechee Cove southwest of Elkmont, and by 1908 had extended a railroad line through the Little River's narrow East Prong gorge to Elkmont. Establishment of the railroad facilitated the intensive logging period at Elkmont, beginning in 1908 and ending in 1926, overlapping the first two decades of the Elkmont resort era.

The community of Elkmont soon developed and included a hotel, post office, commissary, church, railway yard, machine shop, coaling dock, and a variety of cabins for management and workers. Most of the buildings were located on and near the broad floodplain of the Little River, primarily within the area of the present-day Elkmont Campground.

The Resort Era at Elkmont (1910–1934). The following description of the resort era at Elkmont is excerpted from the National Register of Historic Places nomination form for Elkmont (Thomason *et al.* 1993). This description provides an abbreviated history of the period from 1910 to 1934.

The scenic beauty and moderate climate of the southern Appalachian Mountains have long attracted visitors, particularly in the summer months. However, the difficulty of transportation through the mountains in the nineteenth century limited the type of visitors and the areas able to be developed for summer visitation. Soon after the construction of the Buncombe Turnpike in the 1820s, which connected Greenville, Tennessee to Greenville, South Carolina, summer colonies of wealthy South Carolinians developed in the North Carolina mountains, south and east of the Great Smoky Mountains. The purported healthy climate of the mountains was a particular lure for visitors during the middle to late nineteenth century.

Various types of health resorts, many located on springs, were established in western North Carolina and East Tennessee. One of the earliest resorts constructed in Sevier County was Henderson Springs, known as a health retreat as early as the 1830s. A two-story frame hotel and 22 cabins were built later in the 19th century, attracting the patronage of prominent Knoxville families.

The construction of railroads vastly enhanced the potential of the Great Smoky Mountains region for recreational purposes, particularly for those with more moderate incomes. Knoxville was accessible by rail prior to the Civil War, but rail lines did not extend into Sevier County until after the turn of the century. While resorts did develop prior to building of the railroad in this area, they were located along more accessible roads or water routes. An advertisement in an 1897 edition of the Knoxville Journal for Dupont Springs, located 12 miles west of Sevierville, touted not only its three kinds of water, but also its "cool and invigorating" air and "unequaled" scenery. Visitors were advised to travel by boat or horseback to Sevierville. However, the more remote areas of the Great Smoky Mountains remained out of the reach of most summer visitors until after 1900.

The construction of railroads allowed the timber resources of the southern Appalachians to be utilized commercially. After 1900, large northern timber companies, facing depletion of the timberlands in the northeast and Great Lakes, moved into the Great Smoky Mountains and began to develop the infrastructure needed to extract timber. Among the several was one of the large timber companies that worked within the Great Smoky Mountains was The Little River Lumber Company. In 1901, under the direction of the General Manager, Colonel W.B. Townsend, the company began to purchase land in East Tennessee. The Little River Lumber Company was especially interested in cutting hardwoods and hemlock at the higher elevations. To enable them to extract this wood, they created the Little River Railroad Company. Chartered in 1901, it operated until it was dissolved in 1940.

The Little River Railroad Company recognized the opportunity to use the railway for multiple purposes. An observation car was added to the lumber train for passengers who wished to view the scenery along the Little River and by 1909, daily train service was available from Knoxville's Southern Station to Elkmont. The lumber company not only encouraged, but promoted development of land that was logged. In 1910, the Little River Lumber Company deeded the Appalachian Club 50 acres "more or less" along Jakes Creek just upstream from Elkmont. The lumber company retained timber and mineral rights, while the Appalachian

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Club was granted the right "to construct at its own expense, a club house for the accommodation of members and guests, and the right or privilege, of constructing such cottages, or cabins, by itself, or by its members as may be desired" (Sevier County 1910).

Within the District, the Appalachian Club was a Knoxville-based social club. A 1915 brochure describes the Appalachian Club as "composed principally of Knoxville businessmen, for the purpose of providing a place for recreation and rest for themselves." In 1919, the club was reconstituted and formally incorporated as the New Appalachian Club, with its headquarters in Knoxville and its principal clubhouse at Elkmont (Sevier County 1919). Club members were able to buy lots, and rooms in the original clubhouse were deeded to individuals for personal ownership. Membership in the Appalachian Club and the New Appalachian Club included a banker (J. Wylie Brownlee), a university professor (R.C. Matthews), several attorneys (including Forrest Andrews and James B. Wright) and two members associated with the Little River Lumber Company or the railroad (General Manager Col. W.B. Townsend and Railroad Superintendent J. P. Murphy). Wright, Townsend, Murphy, and Brownlee were all cabin owners by 1919.

While predominantly based in Knoxville, members of the Appalachian Club also came from other places in the South. Testimony by H.E. Wright in 1933 noted that, "we have located at Elkmont now 65 summer homes owned by the very best citizens of Knoxville, some from Memphis, some from Athens, some from Nashville, and some from Kentucky, and other places." However, most of the former cottage owners at the Appalachian Clubs, and at the later Wonderland Club, who became leaseholders within the Park, were from Knoxville. Their Knoxville business affiliations included Richards Loan Company, Bowman Hat Company, Price-Baumann Tire, Swan Brothers Bakery and Galyon Lumber. The Little River Lumber Company maintained a legal affiliation with the club until 1930 when a quit claim was filed, thereby ending all formal connections.

One year after the establishment of the Appalachian Clubhouse, the Little River Lumber Company deeded to C.B. Carter a tract of land immediately downstream from the Town of Elkmont. Carter and his brothers founded the Wonderland Park Company and the next year purchased an adjacent tract of land from the lumber company. Construction of the Wonderland Hotel began in the spring of 1912, and the hotel was ready for business by June 15 of that year.

After construction of the Appalachian Club and Wonderland Hotel, a daily passenger train, the Elkmont Special, ran from Knoxville up the Little River to its final three stops that were just minutes apart at the Wonderland Park Hotel, Elkmont, and the Appalachian Club. The trip took approximately two and one-half hours from Knoxville. The Little River Railroad and the Knoxville and Augusta Railroad also promoted "Elkmont Country" through brochures. A 1914 brochure assured the reader that besides being noted for its beautiful scenery, Elkmont Country "is becoming more popular each year as a recreation place for people from all over the South, some of whom have built summer cottages so they and their families may spend the summers in one of the most delightful mountain climates in the entire country." In the same brochure, the Appalachian Club was described in the following terms:

The Appalachian Club . . . has made extensive improvement on its club house and annex since last year, and is now in position to serve its members better than ever before. A complete water and sewerage system has been installed, also a new and up-to-date electric light plan. Here, situated at an elevation of twenty-five hundred feet above sea level and commanding a magnificent view of the Smoky Mountains, some forty or fifty cottages have been built by members of the club. The natural surroundings of the cottages are so beautiful that the possibilities for enhancing the natural beauties are manifold, and this is one of the charms of the place. On the west side of Townsend Avenue flows a tumultuous little mountain stream which furnishes running water in each summer home, and the cottages, rustic and simple, can boast of bath rooms, shower baths and sewer connections together with a natural swimming pool near the club house.

Wonderland Park is described in equally glowing terms in a 1915 brochure:

One of the most beautiful recreation places in the Elkmont country. Elevation two thousand five hundred feet. Hotel new and modern, situated in the heart of the Great Smoky Mountains. Wonderland Park is noted for its picturesque scenery, with river and mountains in delightful vista. A

number of rustic cottages have been built here, which add to the attractiveness of the place. Excellent mountain and rainbow trout fishing in Little River. Horseback riding, bathing and mountain climbing. Accommodations for two hundred guests ...

While the Wonderland Park Hotel was fairly typical of the resorts of the day, the owners of the Wonderland Park Company (the Carter brothers from Knoxville) had land speculation in mind. The original plat for Wonderland had more than 650 tracts, and the Wonderland Park Addition had thousands more. The land that cost \$5 per acre or less was subdivided into 16 lots per acre. Had it actually been built, Wonderland Park would have had the density of a major city for its time. However, even if the grid of streets had been laid, many of the tracts were too small and located on sites not suitable for building.

The President of the Wonderland Company himself sold land through agents in Orlando, Florida. Aside from the hotel and annex, less than twenty buildings were built at Wonderland. Many of the purchasers of land, in fact, never saw the tracts they had bought. It was not until decades later, after creation of the National Park, that some of the business practices of the Carter brothers became known. After the Carters conveyed this land at Elkmont to the Great Smoky Mountains Conservation Association, the deeds and title papers of all prior lot owners in this section were canceled, since the Carters had possession of the land and the locations of the owners of the tracts were unknown. However, even those who had clear title seldom recouped their purchase price and taxes in the creation of the Park. Many were notified that their tracts were only 25-by-100 feet and were on the side of a hill or mountain. Generally, they were offered from \$2 to \$25 for each tract, depending on location.

Due to the legal problems it created, the activities of the Wonderland Park Company were short-lived. By 1913, legal disputes developed between the Carter brothers, and the subsequent lawsuit dragged on for a number of years during which time the defendant, T.M. Carter, died.

In 1915, the Wonderland Park Hotel and immediately adjacent lands and buildings were sold to a group of Knoxville citizens who formed a private club, similar in nature to the Appalachian Club. Both clubs operated hotels that were available to members but were apparently also rented to paying guests. In 1920, the Wonderland Club built the hotel annex that provided additional rooms for club members. The Appalachian Club Hotel burned down in 1933 and one year later was replaced by another clubhouse that still stands today. For almost a decade and a half, recreational and industrial use of the East Prong of the Little River existed side by side. The train from Knoxville made day trips to Elkmont possible. Some stayed at the hotels for short periods, while club members often made extended visits. Passengers could debark at the imposing frame hotel on the hill. The next stop was the town of Elkmont. The final passenger stop was the Appalachian Club Station, where visitors would cross the creek on a footbridge to the Clubhouse. Just beyond the Appalachian Club Station, geared engines (also called Shay type locomotives) replaced the piston-driven locomotives and continued up the steep hills to where lumber operations were occurring.

It should be noted that industrial and recreational users of the East Prong of the Little River were not mutually exclusive groups. Several members of the Appalachian Club were at some point connected to the Little River Lumber Company. Furthermore, in 1928, a 65-acre tract of land belonging to the Little River Lumber Company, adjacent to the Appalachian Club holdings, was deeded to Alice U. Morier, who had married the aging Colonel Townsend. Townsend had been listed as a lot owner in 1919. These properties, adjacent to the Appalachian Club along Millionaire's Row, were not part of the original Appalachian Club deed, but were later included in the negotiation of leases with the Park.

By 1923, much of the accessible timber above the East Prong had been removed, and the lumber company began to focus its efforts on its operations on the Middle Prong. The train to Elkmont was discontinued in 1925 and the tracks were dismantled. In 1926, a gravel road was built through the gorge from Townsend to Elkmont, providing an easier route than the steep mountain road from Gatlinburg through Fighting Creek Gap. The development of roads into Elkmont in the mid-1920s reflects increasing automobile ownership. Many of the cottage owners had been driving as far as Townsend and taking the train from there to Elkmont. Auto-tourism eclipsed the importance of the railroad in the development of the southern mountains for recreational purposes and was later to be a major contributing factor in the creation of the Park. The road from Townsend to Elkmont and on to Gatlinburg was part of the one hundred mile scenic loop that began and ended in Knoxville. This road, which still exists today, passes through Maryville,

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Walland, Elkmont, Pigeon Forge, and Sevierville, and along a portion of the route of present day I-40. The section of the roadway from Townsend to Gatlinburg is within the Park.

Tourism grew and some of the buildings within the town of Elkmont were bought and improved to meet the needs of tourists and visitors to the Wonderland and Appalachian Clubs arriving by bus and private car. In 1927, hotel rooms at the Wonderland Park rented for \$2.50 per day, but visitors renting for a week at a time paid a daily rate that was even lower. Cabins also were available for rent. At the Appalachian Club, residents and visitors stayed in cabins and dined at the clubhouse. Some residents brought their servants along for the summer. Recreation at both locations included hiking, picnicking, horseback riding, outdoor games like horseshoes and badminton, and formal and informal dances. One popular spot during the summer was the swimming hole that formed behind a dammed area of the Little River near the Appalachian Club.

Construction of cabins continued through the 1920s. By 1931, 19 cabins were located at Wonderland. At the Appalachian Club, a number of cabins were also built during the 1920s. Some 75 cabins were present in the two areas just prior to the Depression. A few cabins were built in the 1930s, most notably those built by Mrs. Alice Townsend along the Little River. The Elkmont area in the early 1930s consisted of the cabins, hotel, clubhouse, the small community of Elkmont, and a few mountain farmsteads.

When the community of Elkmont was created around 1908, a cemetery was also established. Located north of the Wonderland Hotel, it was the only cemetery in the area. In 1928, a new Elkmont Cemetery was dedicated adjacent to the Appalachian Club. This cemetery was donated by Levi Ownby [correction to original nomination should read Levi Trentham] in memory of his wife.

Great Smoky Mountains National Park (1930s to Present). The enthusiasm that led to the growth of the Appalachian and Wonderland Clubs was one of the forces behind the movement to create either a national forest or national park in the Great Smoky Mountains. The movement started in Tennessee and later was embraced by supporters in North Carolina. Knoxville businessmen, along with the Chamber of Commerce and the Knoxville Automobile Club, launched the campaign.

In 1923, the Great Smoky Mountains Conservation Association was formed. Initially, its concern was more with building roads than creating a park or forest preserve.

In 1926, Congress passed a law authorizing the creation of two national parks in the Appalachians (Great Smoky Mountains and Shenandoah National Parks) and stipulated that land would be acquired by the states involved. After eight years of land acquisition, the Park was established in 1934; it was formally dedicated by President Roosevelt in 1940.

Major players on both sides of the issue of park establishment were associated with Elkmont. Governor Austin Peay, who spearheaded the purchase of the first large tract of land for the Park, was a member of the Wonderland Club. Mr. and Mrs. Willis P. Davis and Colonel David Chapman were some of the organizers of the Conservation Association, along with J. Wylie Brownlee and attorneys Forrest Andrews and James B. Wright. Wright, who supported the establishment of a national forest, but not a national park, resigned from the Conservation Association and became one of the park movement's strongest foes.

Despite the role several members played in the Great Smoky Mountain Conservation Association, many in the Appalachian Club eventually opposed condemnation of land for the Park, possibly when they discovered that their properties would be among those condemned. They retained James Wright to represent their interests.

In 1932, faced with political opposition, particularly by members of the Appalachian Club, Congress consented to a plan in which landowners could be offered long-term leases. As a result, Appalachian and Wonderland Club properties were acquired from the members for one-half the appraised value, plus a lifetime lease. Some cabin owners chose to sell their land outright for full value.

During the 1930s, nine or ten cottages at the Wonderland Club were acquired by the National Park Service and demolished. Leases also were offered to some long-term, full-time residents in the Park area. However, restrictions on use of natural resources, particularly wildlife and timber, and the loss of the rural communities that made life in the mountains viable presented major obstacles for them. Despite these restrictions, some mountain families remained in the Elkmont area until the 1950s and one resident remained into the 1980s.

With the creation of the national park, commercial development ended at Elkmont. Development of Gatlinburg progressed, although Elkmont retained some commercial activity. Park Superintendent J. Ross Eakin, in a letter to the National Park Service director in 1934, noted that some of the lessees were subletting their cabins. The letter also stated that the Wonderland and Appalachian Clubs were entertaining paying guests and were, in effect, hotels.

The community of Elkmont was gradually removed during the 1930s and 1940s. Many of the frame buildings were dismantled for their lumber and others were moved. The Elkmont Baptist Church was moved to Wears Valley where it stands today as Valley View Church. A 1943 U.S. Geological Survey map shows only two buildings and the Elkmont School remaining on the site. The last class in the school was held that same year. A Civilian Conservation Corps camp was established on the site in the late 1930s. The post office closed in 1950.

In 1952, the National Park Service established a campground on the site of the former Elkmont community and the Civilian Conservation Corps camp. This action eliminated almost all of the remaining, aboveground evidence of the town and camp. However, the road system, which followed the alignment of the Little River Railroad that historically tied the town and the Wonderland and Appalachian Clubs together, remains in use today.

Creation of the national park resulted in preservation at Elkmont, albeit inadvertently, of a fragment of the architecture that was typical of the recreational use of the mountains in the four decades prior to the Park's dedication in 1940. Restrictions on further commercial development, transfer of property, and new construction after 1932 preserved much of the original character of the two club communities at Elkmont, and the majority of the buildings that made up the Appalachian Club and Wonderland Club in 1940 remain. Aboveground physical evidence of the railroad (except for the road system), the timber industry, and the town of Elkmont has disappeared, but belowground archaeological evidence may still remain. Thus far, few archeological investigations have been conducted in the Elkmont Campground, and among those that have been conducted, little to no evidence has been recovered.

3.1.2 Current Condition of Buildings

The descriptions of existing structural conditions of resources currently within the District are taken from the baseline report and recent structural reassessments. The structural assessment was conducted by Cleveland *et al.* (2002 and 2003). For detailed descriptions, see Appendix D. If any of

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the buildings were to be used for overnight stays, the electrical and plumbing systems would have to be brought up to code, sprinkler systems for fire suppression would have to be added, and accessibility for people with impaired mobility would have to be addressed. Any proposed modifications would have to be completed following guidance provided in *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (The Secretary of the Interior 2005a).

3.1.2.1 *Appalachian Club*

The Appalachian Club includes the Appalachian Clubhouse and the areas of Daisy Town, Society Hill, and Millionaire's Row. Each of these elements is discussed below.

Appalachian Clubhouse. The Appalachian Clubhouse served more as a social center for the cabin residents than as a tourist destination. The original building burned in 1933, was reconstructed in 1934, and is in comparably good condition. Designed by Knoxville architect Alfred Baumann, Jr., it has a large porch on the front with cobblestone chimneys and fireplaces at each end of the large social room.

The Appalachian Clubhouse was stabilized by the National Park Service in accordance with the October 1998 NPS Historic Preservation Training Center assessment and recommendations (McGrath 1998). Actions included clearing out trash and debris, securing the doors and windows, installing window vents and louvers, installing brick and stone caps on the two chimneys, and installing several support posts beneath the main floor.

If the Appalachian Clubhouse were to be utilized as a day use facility, it would require restoration of the porch, refinishing of its interior, and creation of entrances and restrooms that met accessibility requirements of the Architectural Barriers Act Accessibility Standards. The crawlspace lattice work would require repair, and the extensive rotting of the wallboards and windows in the basement rooms below the Clubhouse would require attention. The steps to the building would have to be replaced. The sagging porch floor would need to be jacked up and reinforced, and the footings and foundation posts may require repair or replacement.

The results of the condition reassessment of the Appalachian Clubhouse that was conducted in 2003 is provided in Table D-1 in Appendix D. This reassessment noted evidence of minor water damage from roof leaks, settling of the floor in places, and rot or deterioration of building components such as foundation posts, window sashes, window screens, and siding. The existing fixtures are outdated or unusable. Most other building components assessed were determined to be in relatively stable condition. Overall, the condition of the building appeared similar to that observed in 2002.

Daisy Town Buildings. Daisy Town is the area adjacent to and south of the Appalachian Clubhouse that lies between the clubhouse and the road to Jakes Creek Cemetery. There are 20 buildings standing in Daisy Town, 15 of which are considered contributing. The noncontributing buildings in Daisy Town (using the names as they appear in the National Register of Historic Places) are Swan (#4), built about 1910; and four buildings rebuilt in 1974 after a fire destroyed the original cabins, including Sneed (#12), Jamerson (#14), Burdette (#16), and Bagley (#17). The Swan cabin had major alterations and the four 1974 cabins are modern, nonhistoric buildings. The Swan cabin would require exterior restoration in order to be considered contributing if it was retained

under any of the proposed alternatives. The Gaylon cabin (#9) has a noncontributing rear room that would be removed if this building was retained.

The front porches and the close setbacks of most cabins to the road and walkway in Daisy Town create a visual order that strongly suggests the community structure in this portion of Elkmont. The density of buildings and continuous streetscape characteristics, such as border walls and pathways, are complete in Daisy Town, in contrast to other areas of Elkmont where the streetscape and building lines are broken, incomplete, or entirely absent. Because Daisy Town evokes a strong sense of community, this area of Elkmont offers the best opportunity for visitors to understand the former vacation community and the broad cultural pattern of second-home vacation cabins in the southern Appalachians during the early 20th century.

The conditions of all cabins in the Daisy Town area are described in detail in Appendix D. In addition to the Appalachian Clubhouse, only four of the contributing structures in Daisy Town are in good or good to fair condition (see Table D-1). The other contributing structures, which are in fair or poor condition, would require major improvements before they could be reused. Typical conditions in contributing structures here and elsewhere in the Elkmont Historic District that were rated as fair to poor condition include

- rising exterior or interior dampness
- crumbling or leaning chimneys
- insect damaged or missing foundation posts or stones, which cause sagging of the building
- soft, rotting, or missing eaves or siding
- façades that bow inward or outward
- leaning entries or walls
- holes in roofs, siding, floors, or interior walls
- sloping, settling, rotting, soft, or collapsed floors or ceilings
- soft, rotting, collapsed, or missing steps and decks
- damage to roofs, eaves, and gutters from fallen tree branches
- interior water damage from holes in roofs and siding and from missing windows and doors

Society Hill Buildings. Lying south (upstream on Jakes Creek) of Daisy Town, most of the cabins in Society Hill are located between Jakes Creek Road and Jakes Creek. Of the 25 cabins in this area of the Appalachian Club, 16 are considered contributing. All of these cabins are in fair or poor condition (one garage is considered good to fair) and would require major improvements before they could be reused (see Table D-1). All of the noncontributing buildings have major conspicuous alterations or partial or complete loss of structural integrity.

Millionaire's Row Buildings. This area was the last to be constructed and consists primarily of larger buildings. There are eight remaining cabins, six of which are contributing elements to the District. The two noncontributing buildings (as listed in the National Register of Historic Places) are the Parrott cabin (#44) built about 1928 and the Young cabin (#48) built about 1930. Both of these display major conspicuous alterations. As noted in Table D-1, all of the contributing cabins are in fair or poor condition and would require major improvements before they could be reused.

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3.1.2.2 *Wonderland Club*

The Wonderland Club is composed of the Wonderland Hotel and Annex buildings, and 10 cabins. Six of the cabins are considered as contributing to the District, as are the hotel and annex.

Wonderland Hotel. This two-story frame building was built in three stages. The front section facing Little River Road was constructed in 1912, an extension to the east wing was added at unknown date, and the rear wing was constructed about 1928. Details of its construction are described in a baseline cultural resources report (Cleveland *et al.* 2002) and updated in an addendum (Cleveland 2003).

Despite stabilization measures undertaken by the National Park Service in accordance with a plan developed by the NPS Historic Preservation Training Center, the hotel collapsed in August 2005 because of advanced deterioration and the failed structural system. The debris was removed in 2006. As a result, the only option available for the Wonderland Hotel would be reconstruction.

Wonderland Hotel Annex. The annex was built around 1920 to provide additional guest accommodations and a social area. While it was classified as being in good to fair condition overall in 2002, the annex contained areas of spot deterioration that were allowing water to penetrate the building. These entry points had likely been leaking for some time, but the damage they were causing was obscured during previous visits by ceiling and wall coverings. The true condition of the building became evident during the 2003 reevaluation when substantial water damage from a leaking roof at two rear inside corners was discovered. Damage was also noted around the social room fireplace where the roof flashing at the chimney had failed.

Originally, there were two porches on either side of the social room. One porch was open and the other was screened. The open porch, located on the side of the building facing the hotel, had collapsed prior to the 2002 assessment.

Other Wonderland Club Buildings. Ten cabins remain standing in the Wonderland Club, six of which are considered contributing resources. Four noncontributing cabins and a woodshed comprise the remaining buildings in the Wonderland Club. These buildings are noncontributing because they have had alterations and modifications that are not in character with the period of significance, and/or have lost their structural integrity.

The conditions of all cabins in the Wonderland Club are described in detail in Appendix D. All of the structures, including all of the contributing structures, are in fair or poor condition and would require major improvements before they could be reused. Typical conditions in contributing structures that were rated as fair to poor condition are the same as those described for the Daisy Town area.

3.1.2.3 *Ongoing Management*

The National Park Service provides routine vegetation mowing, trimming, and pruning across landscapes surrounding the contributing structures. A 1995 servicewide, programmatic agreement between the National Park Service and Advisory Council on Historic Preservation contains provisions for the National Park Service to manage historic resources while providing for visitor safety. The landscapes surrounding the contributing structures at Elkmont are subject to the same management practices implemented in other areas of the Park, and the management prescription

for landscapes in the District is guided by assessing risks to public health, historic resources, and property on a recurring basis, while recognizing landscapes as dynamic systems.

Some trees that could fall on buildings in the District may require removal. The scale of hazardous tree removal and vegetation management required in the District would be determined by the number of buildings to remain, intended use, and the condition of the landscape at any time. Environmental consequences of vegetation management are discussed further in Chapter 4 for each management alternative.

3.1.3 Cultural Landscape

As part of its research, the National Park Service is charged with inventorying its cultural resources, including buildings and structures, archeological resources, and cultural landscapes. Cultural landscapes are defined in the NPS' *Cultural Resource Management Guideline* as "settings we have created in the natural world" that "reveal fundamental ties between people and the land—ties based on our need to grow food, give form to our settlements, meet requirements for recreation, and find suitable places to bury our dead. Landscapes are intertwined patterns of things both natural and constructed: plants and fences, watercourses and buildings. They range from formal gardens to cattle ranches, from cemeteries and pilgrimage routes to village squares and are special places: expressions of human manipulation and adaptation of the land" (NPS 1997).

The NPS management guideline for cultural landscapes directs that a cultural landscape inventory be undertaken to provide information on "location, historical development, character-defining features, and management" to "assist park managers in planning, programming, and recording treatment and management decisions" (NPS 1997). Great Smoky Mountain National Park began this effort for the Elkmont Historic District by completing draft cultural landscape inventory forms and producing draft site plan drawings in 2001. These were used as part of the baseline cultural resource study (Cleveland *et al.* 2002). Most of these draft drawings were focused on the individual buildings and their immediate surroundings.

The cultural resources baseline work and report included information on the cultural landscapes around each building, as well as those District-wide cultural landscape elements and features that were considered contributing to the District (Cleveland *et al.* 2002). Additional work on the history of the development of the cultural landscape at Elkmont was undertaken and is included in this environmental impact statement as Appendix F. The focus of this additional work was to develop a historical chronology of the cultural landscape development at Elkmont immediately before, during, and shortly after the period of significance, listed in the National Register of Historic Places as being from 1908 to 1940, to determine if it was appropriate to classify Elkmont's cultural landscape into management zones as part of the environmental impact statement process. As part of this study, plan maps from five identified historic periods were developed:

- Pre-National Register of Historic Places Listed Period of Significance: 1880s to 1907
- National Register of Historic Places Listed Period of Significance 1908 to 1940: Sub-period 1908 to 1913
- National Register of Historic Places Listed Period of Significance 1908 to 1940: Sub-period 1914 to 1924
- National Register of Historic Places Listed Period of Significance 1908 to 1940: Sub-period 1925 to 1932

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- National Register of Historic Places Listed Period of Significance 1908 to 1940: Sub-period 1933 to 1942

Emphasis was placed on how Euro-American settlement and occupation patterns affected land use, spatial organization, and use of the natural environment. For each historic period, historic maps, photographs, drawings, and texts were reviewed that identified the topography, natural and cultural vegetation, circulation, natural systems and features, views and vistas, buildings, structures, and small-scale features present in the District. Understanding the landscape over time allowed for informed analysis of what remains of the cultural landscape, as well as what does not remain or is no longer apparent. These maps are presented in the cultural landscape assessment in Appendix F.

Although the official period of significance for the District as defined in the National Register of Historic Places ended in 1940, the period of significance that was considered in the cultural landscape assessment was extended to 1942. This additional period was included to capture the cultural landscape components that were installed during the final period in which the Civilian Conservation Corps was still active in the Park.

While not all characteristics and features from each period have survived, a sufficient number are still present in their original locations. Table 3-2 provides representative examples, by type of feature, of the remaining significant cultural landscape elements within the District.

Because the surviving characteristics and features are located within a National Register of Historic Places-listed historic district and their integrity has been retained, they are recommended as contributing to the District. Those features directly associated with a particular building are recommended contributing to that building, as well as to the District as a whole. Larger, District-wide elements and features that are not directly tied to a particular building, but that meet necessary criteria, are also recommended as contributing to the District.

Researchers found that, in terms of cultural landscape management zones, the cultural landscape characteristics and features are evenly distributed throughout the District to the point that the definition of zones would not be of management value. In essence, the District is a cultural landscape management zone in and of itself and is viewed as a whole unit for management purposes and impact assessment.

3.1.4 Archeological Resources

Archeological baseline investigations were conducted in a series of four survey level studies over a two-year period. The studies were phased to



- gather baseline information on the archeological resources of the District in a way that would build on the small amount of information initially available about the District
- explore potentially sensitive areas based on geomorphological analysis to gain knowledge on the resources potentially present
- collect sufficient information to compare potential management alternatives in terms of the type and amount of archeological work that would be necessary to implement a selected alternative

A complete (100 percent) survey of the entire District has not been conducted. However, sufficient information has been gathered to support the archeological impact analysis and alternative

selection process. The research method for each examination and the scientific reports resulting from these studies were reviewed by Park staff and the State Historic Preservation Officer, Tennessee Historical Commission through the Tennessee Division of Archeology under the Section 106 consultation process. All work was conducted under Archeological Resources Protection Act permit GRSM 02-002.

The earliest known archeological investigations at Elkmont occurred in 1936, when George MacPherson, a Park employee who conducted archeological reconnaissance in Tennessee and North Carolina, discovered artifacts in a field near Little River and Elkmont Road. The site was apparently revisited by Quentin Bass in the 1970s, who noted that the site produced a “pitted cobble” but provided no other information (Bass 1975).

Table 3-2: Examples of Significant Surviving Landscape Characteristics and Features within the Elkmont Historic District

Type and Description of Characteristic or Feature	Representative Photo of Examples Found in Elkmont Historic District	Type and Description of Characteristic or Feature	Representative Photo of Examples Found in Elkmont Historic District
<p>Spatial organization</p> <p>Examples include pattern of watercourses, landforms, circulation routes, topography, vegetation, nodes of development, buildings and structures, and smaller features.</p> <p><i>Photo Descriptions:</i></p> <p>View of Little River adjacent to Elkmont Road between the Wonderland Club and the Appalachian Club</p>		<p>Small-scale features</p> <p>Examples include Wonderland Hotel steps, fountain, and side paths; remnants of Camp Le Conte dam and power plant; Bearwallow Branch footbridge; Civilian Conservation Corps culverts and erosion control walls; remnants of Civilian Conservation Corps walkway at swimming hole; and the stone fireplace or possible still between Cabins 46 and 47.</p> <p><i>Photo Descriptions:</i></p> <p>Remnants of stone wall in the Wonderland Club</p>	

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Table 3-2: Significant Surviving Landscape Characteristics and Features within Elkmont Historic District (Continued)









Type and Description of Characteristic or Feature	Representative Photo of Examples Found in Elkmont Historic District	Type and Description of Characteristic or Feature	Representative Photo of Examples Found in Elkmont Historic District
<p>Natural systems and features</p> <p>Examples include Little River, Jakes Creek, numerous branches (including redirected Bearwallow Branch), and loss of “island” when stone arch bridge cut off branch of Little River through Elkmont Town (current campground).</p> <p><i>Photo Description:</i></p> <p>The Little River</p>		<p>Water features</p> <p>Examples include spring head at Bearwallow Branch; power plant base at Jakes Creek; Camp Le Conte lakebed, dam remnants, and base of power plant; Appalachian Club swimming hole; and underground cistern near Elkmont Town (current campground).</p> <p><i>Photo Description:</i></p> <p>View of Little River “swimming hole.”</p>	
<p>Land use</p> <p>Examples include cemeteries, recreation (swimming hole and campground), and transportation (roads).</p> <p><i>Photo Description:</i></p> <p>Elkmont Campground</p>		<p>Buildings and structures</p> <p>Examples include Wonderland Club area (hotel, annex, and cabins), Appalachian Club area (clubhouse and cabins in Daisy Town, Society Hill, and Millionaire’s Row), and infrastructure (such as water tanks and utility lines).</p> <p><i>Photo Description:</i></p> <p>“Adamless Eden” playhouse in Daisy Town</p>	

Table 3-2: Significant Surviving Landscape Characteristics and Features within Elkmont Historic District (Continued)

Type and Description of Characteristic or Feature	Representative Photo of Examples Found in Elkmont Historic District	Type and Description of Characteristic or Feature	Representative Photo of Examples Found in Elkmont Historic District
Circulation Examples include old road to Gatlinburg via Fighting Creek Gap, roads into and throughout the District following removal of railroad tracks, and Civilian Conservation Corps stone bridge over Little River <i>Photo Description:</i> Little River stone bridge; view of east side		Views and vistas Examples include axial views along watercourses and roads; and partial panoramic views at Wonderland Hotel, at Cabins 58-4d to 58-9i, and near Cabin 40. <i>Photo Description:</i> View northwest from the Wonderland Hotel <i>Photo Description:</i> Axial view along Little River Trail; view facing east from Millionaire's Row. Trail follows former bed of the Little River Railroad.	 
Topography and vegetation Examples include flat land adjacent to watercourses, sloped areas and ridges, native trees and plants of the successional forest, and nonnative species planted by club residents <i>Photo Description:</i> Hemlock forest at Elkmont			

There is no record of additional archeological investigations at Elkmont from the 1930s to the 1990s, although former residents have indicated that prehistoric sites were known to be present in at least the Appalachian Club and Society Hill areas. No archeological investigations were conducted at Elkmont in association with cultural resource studies (Thomason *et al.* 1993) that led to designation of the Elkmont Historic District, and archeological resources are not included in the Areas of Significance in the National Register of Historic Places nomination form. In a comment on a draft of the 1993 report and the nomination, the National Park Service (Brown 1993) explicitly stated doubts about the potential for significant logging-era archeological resources at Elkmont:

Because there is no indication of archeological testing to determine the presence of sub-surface resources, it is hard to accept that the area that was the Elkmont Lumber Camp is likely to yield information about the camp. It also seems unlikely that there would be surviving archeological resources because when the Town of Elkmont was moved and the railroad taken up, little was left behind. The road, trail, and other construction projects by the CCC and the construction of the present Elkmont Campground by the National Park Service in the 1950s would have destroyed archeological remains. For this reason, we do not believe that Criterion D should even be considered or mentioned in the National Register nomination.

In keeping with the period of significance established for the District (1908 to 1940), the National Register of Historic Places nomination and accompanying cultural resource study (Thomason *et al.* 1993) do not mention the potential for prehistoric archeological materials within the District. There also was no mention of the potential for archeological remains associated with the nonlogging-era historic occupations, including the pre-1908 settlement period and the resort-era occupations associated with the Wonderland and Appalachian clubs.

In 1997, an NPS Southeast Archeological Center field crew conducted limited surveys of two small locations, the Elkmont Firing Range Privy Toilet and the Elkmont Campground maintenance shed, within the District. Both locations were found to be disturbed, and no additional work was recommended for those projects (Birdsong 1997).

The first substantial NPS archeological work at Elkmont included surface reconnaissance and was conducted in 2001 by the Park archeologist as a part of the initial baseline studies for the present project. Selected areas where visibility and terrain permitted access were examined, with no subsurface examination and no collection of artifacts noted on the surface. Six areas were identified as having moderate to high probability for cultural materials. One previously recorded site (40BT23) was located and seven other apparent site locations were identified, as well as a possible railroad grade and a well-preserved portion of an early, historic period road. Because of the limited nature of the study, the sites were not registered with the state of Tennessee. It was concluded that a more intensive archeological investigation would be required prior to any ground-disturbing activities at Elkmont.

The initial archeological reconnaissance for the project took place in April 2002, in conjunction with a geomorphological investigation. This work consisted of limited shovel testing of representative landforms and attempts to relocate the sites found by the Park archeologist in 2001. Additional site testing was conducted later that year as part of the Park's "Experience Your Smokies" program (Webb 2002).

Separate from the current planning process, Park staff conducted a limited survey in June 2003 in advance of the rehabilitation of two comfort stations in the Elkmont Campground.

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In November 2003 and March 2004, additional archeological survey of selected parts of the District was conducted to determine the likely effect of the proposed management alternatives on the District's archeological resources. The 2003 and 2004 work represented the most intensive archeological investigations carried out at Elkmont to date. The synthesis of the archeological findings is presented below and is based on the technical report of *Archeological Investigations in the Elkmont Historic District, Great Smoky Mountains National Park, Sevier County, Tennessee* prepared as part of the Section 106 compliance process (Webb and Benyshek 2004).

The combined investigations at Elkmont included limited surface collection and excavation of 467 shovel tests and one 1 x 1 meter unit. A total of 108 (23.1 percent) of the shovel tests produced prehistoric artifacts, including three ceramic fragments and 485 chipped stone tools or debitage fragments (pieces of chipping debris that are the byproducts of stone tool production). Although few diagnostic artifacts were identified, the documented components appear to date primarily to the Archaic period. Woodland materials were identified in only three locations, and no Mississippian or Historic Cherokee materials were recovered.

Historic period artifacts were recovered from 141 (30.2 percent) of the shovel tests. The 1,146 historic artifacts consist primarily of bottle glass fragments and wire nails, but a variety of ceramic fragments and other materials also were found. Most of these materials are associated with the 20th century resort-era occupations of the Wonderland and Appalachian Clubs, although at least two appear to represent earlier home sites.

The survey did not extend into the core of the former logging town of Elkmont, which was located in the area currently occupied by the campground. Few if any artifacts associated with that occupation were recovered (Webb and Benyshek 2004).

Like most large tracts of land in the southeastern United States, the District contains evidence of numerous overlapping prehistoric and historic period occupations. At Elkmont, these include

- historic period artifacts or structural remains associated with
 - more than 100 former or standing buildings, including scattered 19th and early 20th century buildings
 - a former logging and railroad town
 - several clusters of resort buildings
 - a Civilian Conservation Corps camp
- an abundance of prehistoric American Indian artifacts

Although the distribution of some of these remains appears to be limited by natural or cultural features, other distributions appear as continuous or nearly continuous scatters of artifacts that stretch across multiple landforms or around multiple buildings. Both prehistoric and historic materials occur at many locations, and in some cases, distinct prehistoric artifact distributions are linked by a continuous historic artifact scatter.

The survey was limited, and varied widely in intensity and scope across parts of the District since it concentrated primarily on the areas with the most potential to be disturbed by the proposed alternatives. This feature, and the lack of full delineation of essentially all identified artifact distributions, makes it difficult to define site boundaries.

Despite the limitations described above, the National Park Service has attempted to identify workable site boundaries to facilitate management of the archeological resources. The 378-acre District has been divided into eight archeological sites (40SV120, 40SV121, 40SV122, 40SV123, 40SV124, 40SV125, 40SV165 and 40SV166). These sites are separated by topographic or drainage features, and in some cases also represents major historic subdivisions of the District.

Each site contains both surveyed and unsurveyed areas, as well as one or more concentrations or scatters of prehistoric and/or historic artifacts, each of which is designated a separate locus. Although the known resources are not continuous within some of the sites, it is reasonable to expect that continuous distributions would be identified if additional work was conducted. Tennessee site forms have been completed for all sites in the District, and NPS Archeological Sites Management Information System site record forms will be completed for these sites at the conclusion of the project.

Because only part of the District has been surveyed, and because the site boundaries are relatively artificial, it is difficult to derive formal National Register of Historic Places-eligibility recommendations for the identified sites. (Despite these constraints, at least one site, 40SV120, clearly contains significant deposits). Consequently, to facilitate project planning, individual recommendations have been prepared concerning the potential need for additional work at each recognized locus and elsewhere at each site. These recommendations call for avoidance or additional work in all or parts of 12 of the 21 loci that may be affected by project activities. Impacts to the significant deposits at many, if not all, of those loci may be avoidable through project redesign or implementation of additional mitigation measures. In addition, supplemental survey will be required in the unsurveyed parts of the District if those areas are to be affected by project implementation or other land disturbing activities.

The National Park Service evaluated the eligibility of these resources according to the National Register of Historic Places eligibility criteria, as outlined in 36 *Code of Federal Regulations* 60.4. The criteria state that

The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures and objects that possess integrity of location, design, setting, materials, workmanship, feeling and association, and that:

1. are associated with events that have made a significant contribution to the broad patterns of our history; or
2. are associated with the lives of persons significant in our past; or
3. embody the distinctive characteristics of a type, period, or method of construction; or that represent the work of a master, or that possess high artistic values; or that represent a significant and distinguishable entity whose components may lack individual distinction; or
4. have yielded, or may be likely to yield, information important in prehistory or history.

The regulations in 36 *Code of Federal Regulations* 60.4 outline several additional criteria that affect National Register of Historic Places eligibility for certain types of properties:

Ordinarily cemeteries, birthplaces, or graves of historical figures, properties owned by religious institutions or used for religious purposes, structures that have been moved from their original locations, reconstructed historic buildings, properties commemorative in nature, and properties that have achieved significance within the past 50 years shall not be considered eligible for the National Register. However, such properties

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will qualify if they are integral parts of districts that do meet the criteria or if they fall within the following categories:

- a religious property deriving primary significance from architectural or artistic distinction or historical importance; or
- a building or structure removed from its original location but which is significant primarily for architectural value, or which is the surviving structure most importantly associated with a historic person or event; or
- a birthplace or grave of a historical figure of outstanding importance if there is no other appropriate site or building directly associated with his productive life; or
- a cemetery that derives its primary significance from graves of persons of transcendent importance, from age, from distinctive design features, or from association with historic events; or
- a reconstructed building when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and when no other building or structure with the same association has survived; or
- a property primarily commemorative in intent if design, age, tradition, or symbolic value has invested it with its own historical significance; or
- a property achieving significance within the past 50 years if it is of exceptional significance.

In the absence of a formal redefinition of the District to include archeological resources and to extend the period of significance before 1908, these sites and loci are considered here as individual resources rather than as potential contributing resources to the District. It is recommended that such a redefinition take place, but those revisions are beyond the scope of the present work.

The eight identified archeological sites are described in detail, including mapped locations and other technical data, in the Section 106 report (Webb and Benyshek 2004). Because of the sensitivity of these resources and the need to protect them, location information about each site is presented in only general terms. A summary of the findings regarding the archeological sites within the Elkmont Historic District is provided in Table 3-3. More complete information is included in Appendix E.

Table 3-3: Summary of Findings for Archeological Sites within the Elkmont Historic District

Site	Locus	Positive Shovel tests		Recommendations
		Prehistoric	Historic	
40SV120: includes terrace and alluvial/colluvial hill slopes on east side of Jakes Creek in south part of District. Includes Daisy Town and Society Hill areas of former Appalachian Club resort.	A	50 percent (34/68)	48 percent (33/68)	Site is recommended eligible for listing in the National Register of Historic Places and should be considered a contributing element to the District. Undertake further investigation or protect the site from future ground-disturbing activities. Other parts of the site do not appear to contain significant deposits, and no further archeological work is recommended in those areas.
	B	0 percent (0/14)	29 percent (4/14)	
	C	18 percent (11/62)	34 percent (21/62)	
	D	41 percent (9/22)	23 percent (5/22)	
40SV121: includes terrace, alluvial/colluvial hill slopes and upland landforms on the west side of Jakes Creek in the southern part of the District.	A	14 percent (1/7)	14 percent (1/7)	Survey was not sufficient to characterize the site's research potential or eligibility for listing in the National Register of Historic Places. Undertake further investigation or protect the site from future ground-disturbing activities.
	B	80 percent (4/5)	0 percent (0/5)	
40SV122: is located in the southeast portion of the District.	A	43 percent (13/30)	57 percent (17/30)	Most of this site remains unsurveyed. In addition to potential prehistoric resources, the site could contain historic period resources associated with four pre-Little River Lumber Company buildings or other resort-era occupations.
	B	18 percent (2/11)	36 percent (4/11)	
	C	0 percent (0/23)	52 percent (12/23)	
	D	0 percent (0/5)	40 percent (2/5)	
40SV123: is located outside the areas of dense development associated with the logging and resort era activities at Elkmont in the northeast portion of the District.	A	0 percent (0/1)	0 percent (0/1)	Prehistoric deposits are poorly defined and require additional evaluation. Both areas should be protected from future ground disturbing activities. Further investigations will be required should potential ground disturbing activities be planned for this site.
	B	56 percent (5/9)	0 percent (0/9)	
40SV124: is located in the northwestern part of the District.	A	67 percent (2/3)	0 percent (0/3)	While no historic artifacts were encountered by shovel test, artifacts were identified in adjacent areas. Locus A is poorly defined and it is recommended that additional evaluation occur. No additional work is recommended for Locus B.
	B	19 percent (4/21)	0 percent (0/21)	
40SV125: is located in an area of previously dense development associated with the Little River Lumber Company in the western part of the District.	A	100 percent (2/2)	0 percent (0/2)	This site contains five known prehistoric components and four known historic components. A large part of the site remains unsurveyed where further prehistoric and historic components could be present. Further site evaluation is recommended for locuses A, B, C & D prior to any ground disturbing activities in these areas. No further work is recommended for locuses E & F.
	B	33 percent (2/6)	83 percent (5/6)	
	C	20 percent (1/5)	40 percent (2/5)	
	D	N/A no shovel test	N/A no shovel test	
	E	100 percent (1/1)	0 percent (1/1)	
	F	0 percent (0/5)	20 percent (1/5)	

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40SV165: is located on floodplain, terrace and hill slope landforms in the eastern part of the District.	A	20 percent (1/5)	0 percent (0/5)	Most of this site remains unsurveyed although no additional work is recommended in this area.
40SV166: is located on terrace, alluvial/colluvial hill slopes and uplands in the northeastern part of the District.	A	16 percent (7/44)	39 percent (17/44)	Much of this site remains unsurveyed although it contains three known prehistoric components and four known historic components. Additional evaluation is recommended for these sites.
	B	67 percent (4/6)	33 percent (2/6)	
	C	11 percent (4/39)	13 percent (5/39)	
	D	0 percent (0/7)	43 percent (3/7)	

The archeological work conducted within the Elkmont Historic District, despite its limitations, has provided pertinent data concerning the archeological remains present, and has established a framework for recording and, to some extent, evaluating, additional materials that are likely to be found in the future. The eight identified sites in the District include a variety of prehistoric and historic period materials.

The most extensive prehistoric materials consist of quartz debitage, which constitutes a nearly ubiquitous scatter across most surveyed parts of the terraces and alluvial/colluvial hill slopes. Chert is a relatively minor constituent of the debitage compared to most of the quartz distributions. Although only two diagnostic artifacts were found, including a chert Morrow Mountain point and a quartz Late Archaic stemmed point, most of this debitage is likely to date to the Middle and Late Archaic period. There are indications of intact subsurface remains associated with these components in a few areas (such as at site 40SV120 Locus A and site 40SV121 Locus B), and it is likely that significant Archaic period deposits are present in several areas of the District.

Woodland period remains have been documented at three locations: on the hill slope deposits at site 40SV120 Locus D, on the terrace at site 40SV122 Locus A and at site 40SV166 Locus B. The materials at site 40SV120 Locus D are known to date to the Middle to Late Woodland periods, and occur in association with a pit feature. This locus clearly has the potential to provide significant data concerning the Woodland occupations of the Little River valley. Less information is available concerning the other two components, although the component at site 40SV166 appears to have the potential to contain significant deposits.

No Mississippian or Historic Cherokee materials were recovered. Although it is possible (and perhaps likely) that some such deposits are present in unsurveyed parts of the District, this pattern likely represents a lessened intensity of occupation of this upland valley during these periods.

As would be expected, most of the historic period remains from the Elkmont Historic District date to the 20th century, a period that included an explosion in use of the valley associated with the Little River Lumber Company logging town of Elkmont, the resort-era occupations at the Wonderland and Appalachian Clubs, and the establishment of successive Boy Scout, private, Civilian Conservation Corps, and NPS campgrounds. Since the survey was concentrated in the Wonderland and Appalachian Club areas, most of the recovered historic artifacts are associated with those occupations. Most of those artifacts were recovered from diffuse sheet middens that are present in most occupation areas. Those deposits contain mixed materials, from up to 80 years of occupation, and are generally considered to have little research potential. However, discrete deposits with research potential were identified in association with three buildings. It is likely that similar deposits are present in the vicinity of other buildings, but occur as discrete features that are not easily identified in shovel testing.

The survey work recorded structural remains associated with two of the pre- Little River Lumber Company buildings at Elkmont. Although the investigations at each locus were limited, the remains at those and similar home sites have research potential.

Very little work was conducted at the former Elkmont town site, and essentially no artifacts were recovered that can conclusively be associated with that occupation. Although the former town site is believed to have considerable research potential, this remains to be demonstrated through additional research or compliance-oriented work.

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3.1.5 Area of Potential Effects

The area of potential effects is a cultural resources concept that is specific to Section 106 of the National Historic Preservation Act mandate to identify a project's potential impact area (36 *Code of Federal Regulations* 800.4[a][1] and 800.16[d]). It is that area that includes all of the direct effects (for example, removal of the buildings that are considered contributing to the District) and indirect effects (for example, an increase in visitation to the District could result in more visitors strolling through nearby, undisturbed areas and picking up surface artifacts) that could result from implementation of any of the proposed alternatives.

The visual limit into the District is defined by a string of points encircling the District from which one can look into and no longer observe anything manmade. This visual limit constitutes the maximum area of potential effects for the Elkmont project and encompasses the maximum area of potential change. The location of the boundary defining the area of potential effects may constrict or expand, depending on the alternative selected for implementation; however, no boundary would extend beyond the maximum area of potential effects or visual limit line.

The maximum area of potential effects was delineated in the winter (2003) when the leaves were off the trees and the cultural landscape of the District was most visible. Figure 3-1 illustrates the maximum area of potential effects. The small circles on the figure indicate where map coordinate readings were made, and the boundary was drawn by connecting these points of observation. These points are at the elevation from which an observer cannot see the buildings, structures, and roads at Elkmont.

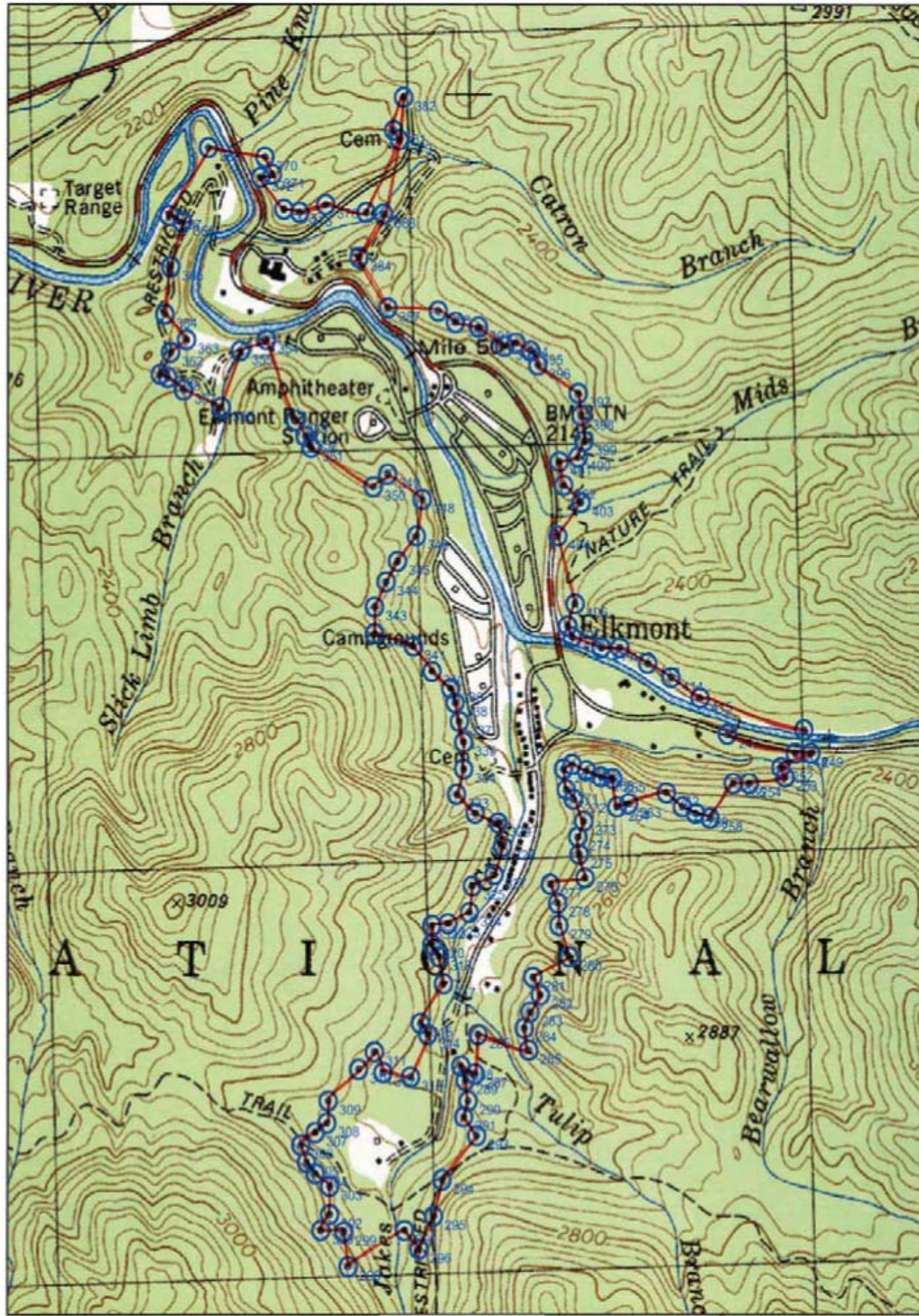
For the most part, the maximum area of potential effects for the management alternatives proposed for the District is within or borders the physical boundary of the District, as described in its nomination. It extends outside the District nomination boundary at its most southern end, near the area of the NPS horse barn, because of the flatter topography in this part of the District.

Chapter 2 of this document provides a detailed description of each alternative. The proposed management alternatives for the District that have the largest area of potential effects are the No Action Alternative (implementation of the current *General Management Plan*) and Alternative A. The No Action Alternative would remove all contributing structures within the District and leave only remnants of cultural landscape features such as stone walls that would not pose a safety hazard. Alternative A would do the same, except all foundations would be removed to ground level, as would many of the cultural landscape features. These two alternatives would have the largest area of potential effects because they would cause the most visible change within the Elkmont Historic District.

A visual quality assessment was performed within and adjacent to the District as part of this planning process. The visual quality assessment was performed because the overall visual quality of the District not only considers cultural resources, but relates to and considers all other resources as well and is described in the following chapter. In determining the environmental consequences that could result from implementation of any of the proposed alternatives, potential impacts to all resources are described. In this analysis, the area of potential effects for other resources does not necessarily coincide with that of cultural resources. Environmental consequences are described in terms of the potential for direct, indirect and cumulative effects and must consider each resource in its own context. As such, analysis of environmental consequences may extend well beyond the cultural resource area of potential effects, especially if a resource that may potentially be affected

by project implementation is rare within the region, the Park, or globally. Therefore, the area of potential effects was defined to comply with Section 106 of the National Historic Preservation Act, whereas the viewshed analysis was performed to gather existing information for the National Environmental Policy Act process. This process is described in detail in Section 3.5.1 of this document.

Figure 3-1: Area of Potential Effects for Elkmont Historic District Cultural Resources (Maximum Limit)



3.2 NATURAL RESOURCES

3.2.1 Geology

The rocks that underlie Great Smoky Mountains National Park and the vicinity are part of the western Blue Ridge Geologic Province in the southern Appalachian Mountains. Most bedrock in the Park consists of a thick mass of variably metamorphosed sedimentary rocks of late Precambrian age. The dominant units underlying the Little River watershed are the Elkmont and Thunderhead Sandstones, which are massive, thick-bedded, feldspathic sandstones, composed of detrital quartz, potassium feldspar, and plagioclase and metamorphic biotite, muscovite, and chlorite. Bedrock in many areas is overlaid by deposits of alluvium, colluvium, and saprolite that are locally up to 30 meters (about 100 feet) thick (Mast and Turk 1999). The bedrock underlying the portion of the watershed that contains the Elkmont Historic District is composed of less metamorphosed rock (slates, sandstones and metasiltstones) of the Thunderhead formation. The sedimentary bedrock is late Precambrian, about 500 million to 1 billion years old.

Processes of erosion and deposition formed the landscape within the District. Some rocks and sediments moved from higher elevations through landslides, while water left sediment deposits. The contemporary landscape probably formed during periods of colder and/or wetter climate thousands of years ago. Movement of rock and sedimentary material probably occurred during the late Pleistocene through middle Holocene period. There is no evidence to suggest the exact mode of placement of landscape material, although data from the Ravensford Tract in the Oconaluftee drainage indicate that debris flows sufficient to move boulders could have been fairly common during the early and middle Holocene period. Some of the mass-wasted sediment was likely deposited during the last glacial maximum under periglacial climatic conditions. The elevation of boulders in the low terrace indicates that the streambed was about 3 to 6 feet higher than it is now, and that it probably was carved out to its present elevation during the latter half of the Holocene period (Webb 2002).

3.2.1.1 Geomorphology

A geomorphic reconnaissance within the District boundaries was conducted to identify the major landforms present. The five principal landforms that were identified are discussed below in terms of the area's sedimentation history.

Floodplain. The floodplain is the alluvial land surface that is being constructed by the modern regime of the Little River and its tributaries. It is the first distinct alluvial surface above the river and stream channels. The highest elevation of this surface ranges from about 1.5 to 6.5 feet above the base flow water level of the river and its tributaries.

The floodplain tends to be a narrow corridor of land, which indicates that the river and streams have not been graded to this elevation for a very long period of time. The floodplain probably receives new sediment (historical in age) during relatively frequent overbank flood events that recur with a frequency from six months to five years. The youngest parts of this surface consist of imbricated boulders and cobbles, and the older parts have a layer of sand and silt over the cobbles

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that are typically less than 20 inches thick. No auger holes were drilled into the floodplain deposits, but observations were made from cut banks along the active channel.

Low Terrace. The low terrace is the first widespread alluvial surface with increasing elevation above the floodplain. The average top elevation is at about 5 feet to 10 feet above the baseflow water level, but it can be as high as 13 feet. There is considerable topographic relief on this surface, because boulder bars and intervening swales are common. This is the most extensive alluvial surface in the valley at Elkmont, and makes up most of the area where the Elkmont Campground and buildings are situated. Some relatively low swales on this surface are probably the only portions of this landform that have received overbank flood sediment over time. This surface has many very large boulders, some of which are larger than 6 feet in diameter, indicating that debris flows were an important sediment source for the alluvium, and that flooding on a much larger scale than what is presently experienced was likely responsible for sedimentation of this surface.

Five auger holes were drilled into the low terrace. Each hole exhibited a silty to sandy layer of sediment less than 3 feet thick that overlies cobbles and boulders. Locations of those auger tests were mapped by Webb (2002). In some places, cobbles and boulders are at the surface and completely lack a fine-grained stratum. The soil traits indicate that the low terrace is probably from the Holocene period. This surface exhibits characteristics that correlate closely to those of the first terrace at the confluence of Raven Fork and the Oconaluftee Rivers on the east side of the Park, which has been dated to 3,000 to 8,000 years old (Webb 2002).

High Terrace Remnants. Small remnants of high terraces occur sporadically throughout the District. The largest remnant occurs in the amphitheater area, but it appears to be covered with a layer of hill slope sediment. Other patches of high terrace remnants were too small to map at the scale investigated. The available outcrops exposing this unit indicated a much greater degree of soil weathering than was seen in the low terrace. These high terrace remnants represent a much higher elevation of the stream base level in the past. All available evidence (profile weathering and stratigraphic relation to the low terrace) suggests that this surface is Pleistocene in age.

Alluvial/Colluvial Hill Slope Deposits. Alluvial/colluvial hill slope deposits are aprons of colluvium and alluvium along the sides of the valleys. They have been transported from the uplands and redeposited in the lower back slope, foot slope, and toe slope positions. Many of the hill slope deposits occur as lobes of sediment that emerge from small first- and second-order tributaries where they enter the main valley of the Little River and Jakes Creek. The thickness of the hill slope deposits is not well known. Because cobbles and boulders were always encountered in auger holes, the depth of analysis within this unit was restricted.

Seven auger holes were drilled into hill slope deposits. These hill slope deposits are essentially identical to the Holocene hill slope sediments that were radiocarbon dated as part of the geomorphic investigations of the Ravensford Tract in the Oconaluftee drainage (Webb 2002). Unlike the valley at Ravensford, an older phase (Pleistocene) of hill slope deposition was not identified at Elkmont, and it appeared that the majority of these deposits are from the Holocene period. A buried A horizon was found in one auger hole, indicating that the youngest of these deposits is historical in age. Some of the older Holocene hill slope sediments have been somewhat dissected and appear as low spurs of foot slope deposits protruding into the valley.

It is possible that the hill slope deposits could contain artifacts associated with PaleoIndian populations (about 12,000 years old) or later time periods. In addition, unoxidized sediments that could be present within or sealed beneath such deposits could potentially contain intact plant subfossils that could provide information on past environments in the Elkmont vicinity.

Rocky Upland Slopes. The rocky upland slopes are the hill slopes that consist of bedrock and saprolite with a thin veneer of colluvium. Much of this sediment is rather coarse, consisting of angular cobbles and gravel.

3.2.1.2 Soil Characteristics

Most soils in the watershed are classified as Inceptisols that are fairly deep, well-drained soils developed in residuum weathered from the underlying bedrock (NPS 2002b). Chemically, these soils tend to be acidic (pH 4.1 to 5.8), with low organic content and low cation-exchange capacities (NPS 2002b). The exchange complex is almost entirely derived from the organic matter and is generally dominated by aluminum.

The U.S. Department of Agriculture, Natural Resources Conservation Service is mapping soils in the Park. Soil mapping for Sevier County, including the District, has not yet been published, but is available in draft form (Figure 3-2). The following description of the soils found in the District is based on information from Khier (2002 and 2004).

The floodplain, low terrace, and alluvial/colluvial landforms are composed of Spivey-Santeetlah-Nowhere complex. This complex is found in the Daisy Town, Millionaire's Row, Society Hill, and campground areas within the District. Slopes vary from 2 to 30 percent. The Spivey soil series consists of very deep, well drained, cobbly soils in long narrow areas in valleys, and in coves in mountainous areas. Formed in colluvium from metasedimentary rock (mostly sandstone of the Thunderhead formation), they are classified as loamy-skeletal, mixed mesic Humic Dystrudepts. The Santeetlah series consists of very deep, well-drained, moderately rapidly permeable soils on benches, fans, and foot slopes in coves in mountainous areas. They formed in colluvium from metasedimentary rock (phyllite, slate, and sandstone). They are classified as coarse-loamy, mixed, mesic Humic Dystrudepts. Spivey and Santeetlah soils have thick, dark surface layers, and are very deep. Spivey soils also have more than 35 percent rock fragments in the subsoil and make up about 20 percent of the map unit.

The high terrace landform is composed of Lonon loam, with 8 to 30 percent slope. This soil unit is found in the area west of Daisy Town near Jakes Creek Cemetery and in the Wonderland Hotel area. This map unit consists of deep to very deep Lonon soils on sloping colluvial benches and fans. These soils are well drained. Mapped areas are remnants of once larger colluvial deposits from the surrounding mountains. Permeability is moderate and there is very little runoff in forested areas where leaf litter has not been fully or partially disturbed. Runoff is rapid in nonforested area. The water table is more than 6 feet below the surface.

The rocky upland slopes are composed of Soco-Stecoah complex, with 30 to 95 percent slopes. This complex is found in the northeast part of the Elkmont Historic District south of the Catron Branch and east of the Little River Road. This soil type consists of moderately deep Soco soils and deep Stecoah soils on very steep south-to west-facing side slopes in the intermediate mountains. Both soils are well drained. Mapped areas are irregularly shaped and range from 5 to 50 acres.

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These soils are too intricately mixed and small in size to separate them in mapping. Permeability is moderately rapid. Surface runoff is slow where forest litter has not been disturbed and is rapid where litter has been removed.

Other than Lonon loam (15 to 30 percent slopes) described above, most of the Wonderland Hotel area consists of the Junaluska-Brasstown complex (15 to 30 percent slopes). Soils in this map unit include moderately deep Junaluska soils and deep Brasstown soils. Both soils are found on moderately steep south- to west-facing hill slopes and are well drained. Areas with these soil types are long and narrow, covering areas from 5 to 50 acres. Junaluska soils usually comprise 35 to 45 percent of this soil unit, while the Brasstown soils portion is 35 to 45 percent. The two soils occur together, and cannot be accurately separated for mapping. These soils are moderately permeable. Areas where there has been substantial ground disturbance exhibit rapid runoff of precipitation, while runoff in areas that remain covered by leaf litter is slow.

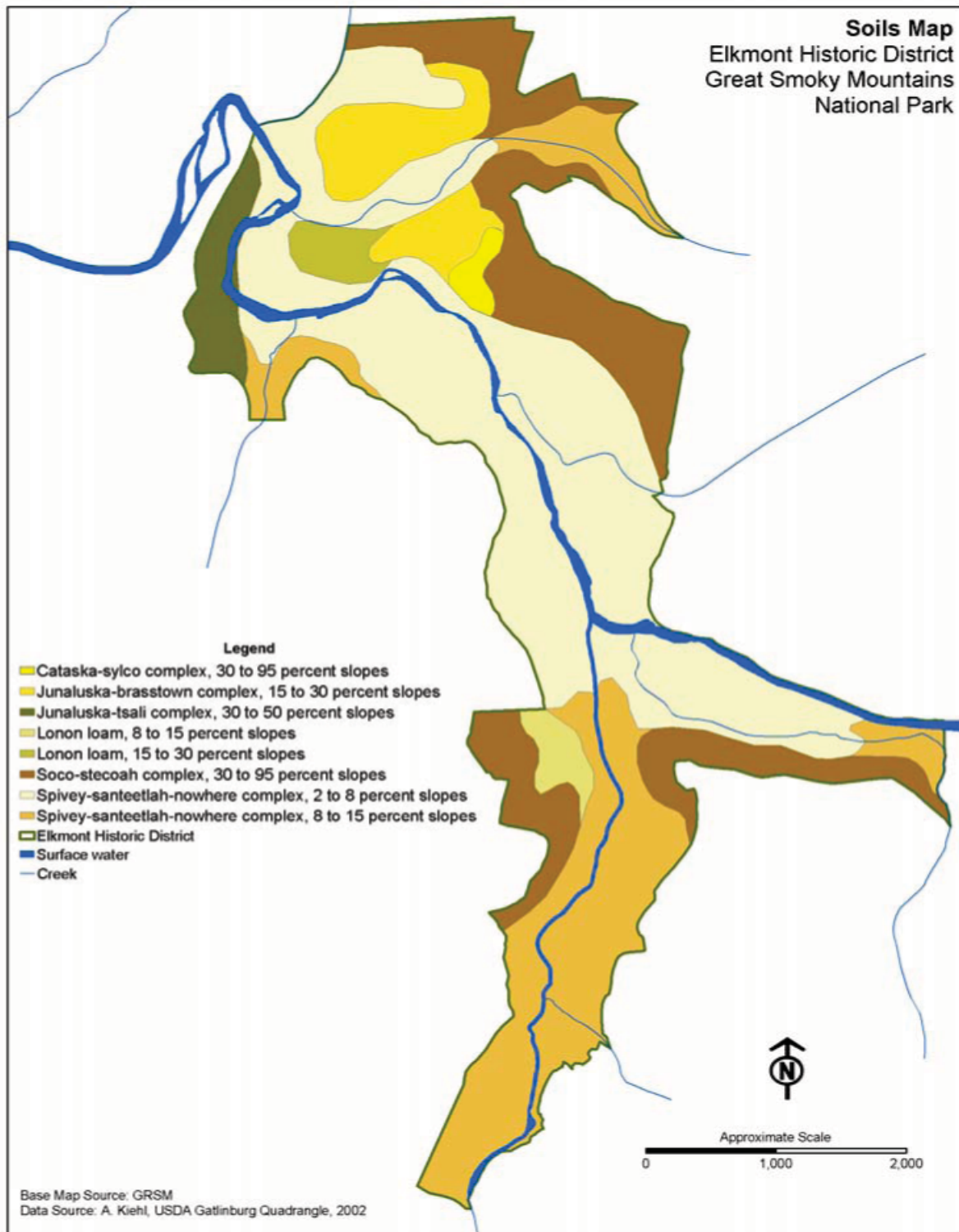
Small areas of Santeetlah, Spivey, and Tsali soils are included in this soil unit. Santeetlah and Spivey soils are found along drainageways and have dark surface layers. The subsoil layer of Spivey soils is comprised of more than 35 percent rock fragments. In addition, Santeetlah and Spivey soils are very deep to weathered bedrock. Tsali soils are on highly divided areas and are shallow to weathered bedrock. Approximately 20 percent of the soils in this map unit are comprised of these soil types.

Soils similar to Junaluska and Brasstown soils are also included in this map unit. These soils may have a rockier surface layer or subsoil layers that are browner.

A small portion of the Wonderland Hotel area consists of the Cataska-Sylco soil complex. This complex is in very rocky areas with steep (50 to 95 percent) slopes. This map unit consists of shallow Cataska soils and moderately deep Sylco soils. They are generally found on steep slopes in low and intermediate mountains. Sylco soils are well drained and Cataska soils are excessively drained. These areas generally range from 10 to 80 acres in size. Typically, this unit contains 40 to 50 percent Cataska soils, and 30 to 40 percent Sylco soils. These soils are too intricately mixed and small in size to separate them in mapping.

These soils have moderately rapid permeability, with slow runoff where the leaf litter has not been substantially disturbed and rapid runoff in areas lacking leaf litter. Weathered bedrock is found at 10 to 20 inches below surface in Cataska soils and 20 to 40 inches below surface in Sylco soils. Sylco soils have a wide range of organic matter content in the surface layer (low to high), while Cataska soils range from low to moderate organic matter content. These soils are underlain by sulfuric rock that may be exposed by road building and produce acidic runoff and seepage when exposed to precipitation. This acidic fluid may eventually flow into streams nearby and result in water quality degradation. The rock is also susceptible to landslides during periods of rain.

Figure 3-2: Draft Soil Map of the Elkmont Vicinity



Small areas of Junaluska, Soco, and Spivey soils are included in this complex. Less than 35 percent of the subsoil in Junaluska and Soco soils is comprised of rock fragments. The subsoils of Junaluska soils also have a higher component of clay. The surface layer of Spivey soils is thicker and darker. Junaluska and Soco soils are found at the base of slopes, while Spivey soils are found along drainageways. Approximately 20 percent of the map unit is comprised of these soil inclusions. Soils similar to Cataska and Sylco soils are also included in this unit and have a composition with fewer rock fragments and/or subsoils that are more reddish.

3.2.2 Biotic Communities

Great Smoky Mountains National Park is a richly diverse landscape, hosting approximately 1,600 species of flowering plants and more than 50 native mammals, 200 species of birds, and a large variety of reptiles, amphibians, salamanders, invertebrates, insects, and other organisms. Approximately 20 percent of the forest within the Park has old growth characteristics. Many other areas are in a variety of stages of succession following disturbance from logging and agricultural practices that occurred prior to the Park's establishment (United Nations Educational, Scientific, and Cultural Organization 2004).

Vegetation communities differ with changes in elevation, slope, and slope aspect. The combination of variable topography, presence of the Little River and its tributaries, and past land uses have all contributed to development of a variety of vegetation communities throughout the District. These communities, in turn, provide habitat for a diverse population of aquatic and terrestrial organisms. Biotic communities of the District are discussed below.

3.2.2.1 Aquatic Communities

Streams and other aquatic environments in the Park provide essential habitat for numerous species of invertebrates, reptiles, and amphibians. Many reptiles and invertebrates, and all amphibians, spend a portion of their life cycles in aquatic environments. Forty-one species of reptiles, including 24 species of snakes, nine species of lizards, and eight species of turtles are known to occur in the Park. The Park also contains a great diversity of amphibians, including 31 species of salamanders and 13 species of frogs and toads (Nichols 2004).

Benthic Surveys. Tennessee contains six rivers classified as "Outstanding National Resource Waters." The Little River received this classification and also was chosen by the Tennessee Division of Water Pollution Control as a reference site in a program to help implement water quality standards.

Benthic community research and water quality data (presented in Section 3.2.4) both indicate that the Little River contains water that is not degraded and has low levels of contaminants. Benthic invertebrate surveys are conducted annually on the Little River by Park personnel at a sample site about 3 miles upstream from Elkmont that is accessed using the Little River Trail.

Researchers follow protocols similar to the Rapid Bioassessment Protocols of North Carolina's Department of Environment/Water Quality. They assess species diversity and determine a biotic index score (ranging from poor to excellent) for each stream site. Because invertebrate species vary in their level of tolerance for chemicals and contaminants in water, species composition and

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richness tend to change as water quality declines. The biotic index takes into account both the number of species present and the level of tolerance the species show for pollutants. The highest value is assigned to species that are the most sensitive to pollution and the lowest is given to species that are more tolerant to polluted waters. Calculation for the biotic index utilizes both species abundance and the tolerance value, and then assigns an index value from poor to excellent based on a particular range.

From 1994 to 2000, surveys found between 52 and 82 invertebrate species at the Little River sampling site. As shown in Table 3-4, the biotic index scores ranged from good to excellent.

Table 3-4: Little River Invertebrate Data

Year	Number of Species	Biotic Index Score
2000	63	Good
1999	64	Excellent
1998	52	Good
1997	72	Good
1996	No data	Not available
1995	76	Excellent
1994	82	Excellent

Source: NPS 2002b

Fish Surveys. The ongoing fishery management program at the Park began in the mid-1980s. It is conducted by the Fisheries Division, Natural Resources Branch, Division of Resource Management and Science. The goal is to assess fish communities and annual variation in population density and biomass in large- and small-stream sites that best represent in-stream habitat. Specific program objectives include

- monitoring native brook trout distribution
- monitoring large-stream fish communities and evaluating angler use
- restoring populations of native brook trout in selected streams
- monitoring atmospheric and geological deposition throughout the Park

Sampling sites were selected to provide elevation profiles typical of montane streams in the Park, and data are generally collected on an annual basis.

Four sampling sites are located within or near the District, including two sites on the Little River and two sites on Jakes Creek.

- One of the Little River sites is just below the Elkmont Road junction with Tennessee Highway 73 at an elevation of 1980 feet.
- The other Little River site is upstream near the Little River truck road turnaround at an elevation of 2300 feet.
- The site further downstream on Jakes Creek is close to the pump house at an elevation of 2320 feet.
- The upstream site on Jakes Creek is by the stream crossing on Meigs Mountain trail at an elevation of 2480 feet.

Data from three large streams in the Park are collected in a large-stream monitoring study. Since 1986, fish population estimates have been conducted at sampling sites on Cataloochee Creek, Little River, and Abrams Creek. Abrams Creek had 18 species, the Little River had 12 species, and Cataloochee Creek supported seven species. Species diversity appears to increase in a downstream direction. Species diversity and composition of the three streams sampled are indicative of coldwater and coolwater ecosystems (Moore and Kulp 1994).

Some of the most common fish species found in the Little River include the mottled sculpin (*Cottus bairdii*), longnose dace (*Rhinichthys cataractae*), northern hogsucker (*Hypentelium nigricans*), river chub (*Nocomis micropogon*), stone roller (*Camptostoma anomalum*), saffron shiner (*Notropis rubricroceus*), and rainbow trout (*Oncorhynchus mykiss*). The latter is a popular game species that is not native to Tennessee.

Trout and other members of the salmonidae family, such as whitefish and salmon, generally require cold, clean water habitat with pools and riffles. For many visitors to the District, these fish are an important resource, providing recreational fishing opportunities. Comparing the three streams, mean salmonid biomass was greatest in Cataloochee Creek (82.2 pounds per acre), followed by the Little River (74 pounds per acre) and Abrams Creek (72.4 pounds per acre). Mean salmonid density followed the same trend.

Abrams Creek supported 14 species of nongame fish, the Little River supported 10 species, and Cataloochee Creek supported five. Nongame species comprise 50.3 percent of the biomass in the Little River.

The major factors influencing fish populations are droughts and floods. Major droughts occurred in 1987 through 1989 and 1999 through 2001. A major flood in the Little River with flows greater than 1,000 cubic feet per second occurred in 1994.

3.2.2.2 Terrestrial Communities

The Unaka Mountains region separates the Great Valley of Tennessee from North Carolina and lies on the western edge of the Blue Ridge physiographic province (Isely 1990; Wofford and Chester 2002). The majority of the province is in Tennessee. This region includes the group of mountains called the Smoky Mountains that encompasses the District. Many plant species in this region show a strong affinity to specific physiographic provinces and are found less frequently in other provinces.

Descriptions of the vegetation communities within the District are based on two data sources.

- The Community Element Global system was developed by the Association for Biodiversity Information. (This organization became NatureServe in 2001 and currently maintains databases to support the United States National Vegetation Classification System and the plot data on which it is based.) The Community Element Global system assigns a unique identifier code to each vegetation association (community) in the central biodiversity database.
- The Center for Remote Sensing and Mapping Science and NatureServe used aerial photo interpretation and field verification to develop maps and a database that describes the vegetation communities in the Park. The classification system is outlined in the *Draft Report*:

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Vegetation Classification System for Mapping Great Smoky Mountains National Park (Center for Remote Sensing and Mapping Science and NatureServe 2003).

The resulting map of plant communities in the District is a combination of the Community Element Global system and the *Vegetation Classification System for Mapping Great Smoky Mountains National Park*. The hierarchy in the terrestrial system has seven levels, including five coarser physiognomic levels and two finer floristic levels. Vegetation community types that have a common configuration and roughly defined environmental factors are combined in the same formation. Characteristics such as vegetation type (forest, woodland, or shrubland), growth habit (annual or perennial), leaf characteristics (needle-leaved, evergreen, or deciduous) and whether the vegetation was planted or occurs naturally are used to distinguish these formations. Each formation consists of “alliances,” which refer to a group of plant “associations.” The association is defined as “a plant community of definite floristic composition, uniform habitat conditions, and uniform physiognomy.” The areas delineated on Figure 3-3 represent the floristic levels of association within the Elkmont Historic District. Table 3-5 lists the plant communities (common name) along with the name of the association for the area shown in the figure.

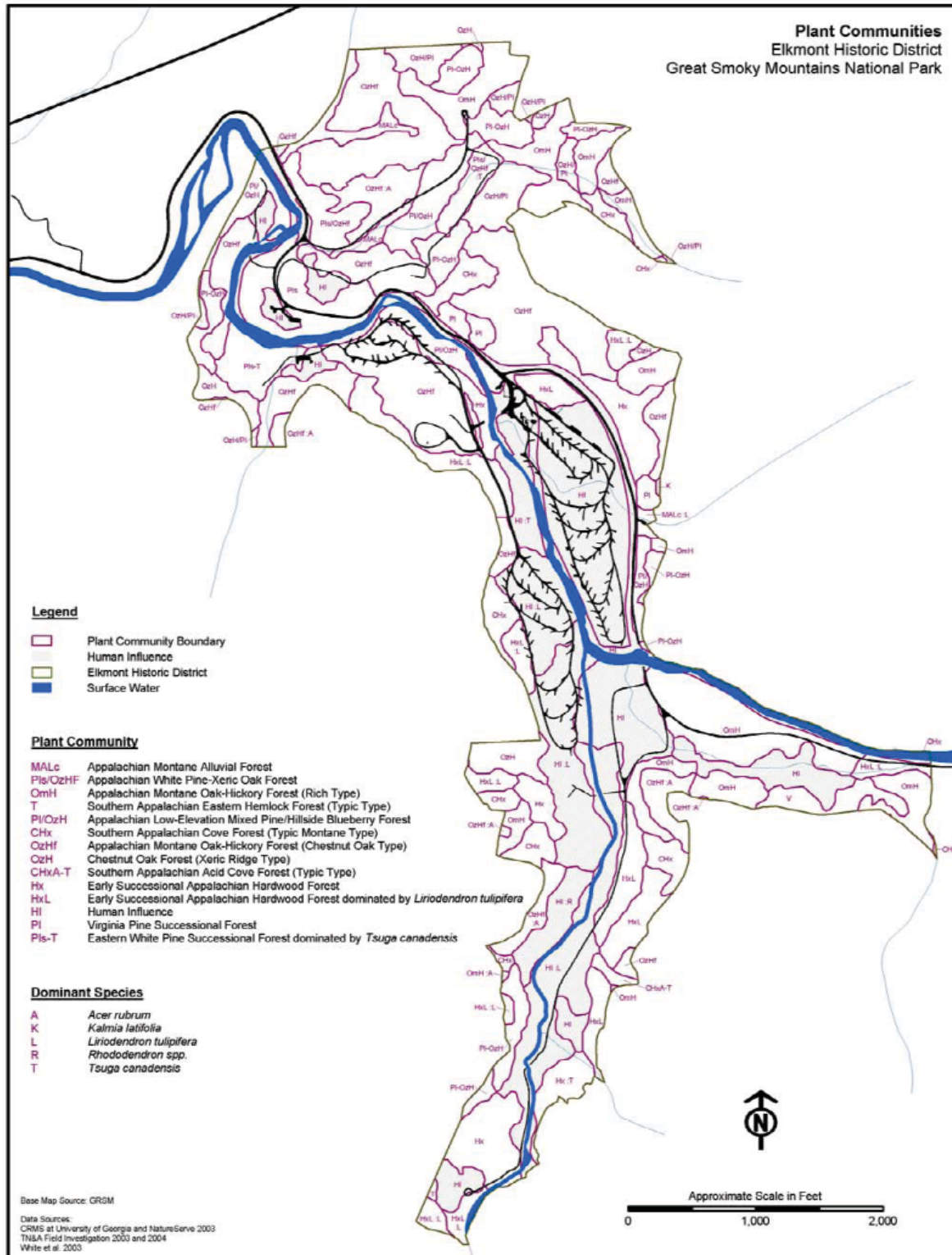
The Global Conservation Status rank identified for each plant community listed in Table 3-5 is based on factors such as current geographic extent, threats, number of distinct occurrences, degree of decline from historic extent, and degree or alteration of natural processes affecting the dynamics, composition, or function of the type (White *et al.* 2003). Characteristics of the District’s plant communities are described below, as provided in the *Vegetation Classification of Great Smoky Mountains National Park* (White *et al.* 2003). A description of the distribution of plant communities throughout each planning area of the District (Millionaire’s Row, Wonderland Club, Daisy Town, Society Hill and the Elkmont Campground) is provided following the plant community descriptions. The distribution of these communities is shown on Figure 3-3.

Globally Imperiled Associations (G2)

Appalachian Montane Alluvial Forest (MALc). This association covers alluvial forests of the southern Blue Ridge Mountains and nearby portions of the inner Piedmont. In the Park, it is associated with narrow, rocky floodplains and islands of medium to large streams, especially sections of streams that are flat or gently sloping. This community is naturally uncommon in the southern Blue Ridge. Well-developed examples are rare because of past clearing for agriculture and development.

Floodplain forests in the southern Appalachians are among the most ecologically diverse plant communities in North America. Because of the high fertility and topographic protection of these sites, the tallest trees in eastern North America are found in this community type, with mature trees typically reaching heights of 165 feet or more. The tallest recorded tree in the Park and in the state of North Carolina is located in this forest community type and measured 234 feet prior to storm damage in 2004. Earliest historical accounts by European settlers and explorers describe the magnificence of montane alluvial forests.

Figure 3-3: Plant Communities of the Elkmont Historic District



Much of the ecological diversity and importance of montane alluvial forests extends from the unique structure, biota, and ecosystem processes created by their environment. Because they occur at the bottom of extremely steep, high-gradient upland drainages, their floodplains serve as a collection point for soil and other material deposited by water flow and gravity. The resulting deep soils are typically rich in nutrients and organic matter and may contain multiple, buried soil horizons. In addition, flooding and deposition within the river floodplains result in a diverse patchwork of habitats. Within a mile-long stretch of montane alluvial forests, habitats may include rich areas of deposited soil and debris teaming with invertebrates and fungi, scoured areas that provide important habitat for rare species, and small depressional pools that are intermittently flooded and provide habitat for breeding amphibians. The biological diversity of montane alluvial forest floodplains has received little study, but work conducted as part of the Ravensford Land Exchange in North Carolina revealed a rich flora and fauna with dozens of undescribed species.

Past impacts to montane alluvial forests represent a critical, negative impact both within and outside Great Smoky Mountains National Park. The most recent vegetation mapping identified 6,590 acres of this plant community type within the Park, which is approximately 1 percent of the Park's total area. However, the amount of this plant community found within the *floodplains* of large rivers and streams within the Park is a small fraction of this total. Steep upland drainages 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 *floodplain* forests.

Montane alluvial forests are threatened by disturbances that cause changes in hydrology, and many of these sites were the first to be settled because of their flat terrain and access to waterways. Following establishment of the Park, floodplains continued to be used for roads, visitor centers, and Civilian Conservation Corps camps. In addition, a substantial number of these floodplain forests, including those along Hazel Creek, Eagle Creek, and Abrams Creek, were lost with the creation of two reservoirs. In the District, the floodplain of the Little River was used as a site for the Elkmont Campground. Most of the structures in the Appalachian Club area are located on alluvial/colluvial flats and benches at the confluence of Little River and Jakes Creek.

Even more severe losses have occurred outside the Park where floodplain forests continue to be lost as a result of increasing and intensifying land use. On private land, floodplains have been lost to development (including structures and roads), reservoirs, and agriculture. The few remaining, privately held floodplain forests are typically highly fragmented and infested with nonnative plant species. In addition, there are no assurances that these areas will remain forested. Federal and state lands offer the best opportunities for their protection. However, within national and state forests, floodplain forests are managed for multiple uses. While best management practices (including 50- to 100-foot-wide buffers around streams) are used, timber harvests are often conducted in floodplain forests because of their accessibility and high productivity.

The continuing loss of floodplain forests has led to their classification as “rare” or “imperiled” by many organizations and agencies. Biologists from the North Carolina Department of Environment and Natural Resources and the Tennessee Department of Environment and Conservation have described the floodplain forests of Elkmont as rare and highly significant. (TDEC, January 29, 1996 and NC DEHNR, January 16, 1996). Further, because of the linear nature of floodplain forests, restoration of this and similar sites was described as important to the long-term connectivity of adjacent upland forest communities.

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Table 3-5: Vegetation Associations of the Elkmont Historic District

Map Key	Association	Community Name	Global Conservation Status Rank
MALc	<i>Platanus occidentalis</i> – <i>Liriodendron tulipifera</i> – <i>Betula (alleghaniensis, lenta)</i> / <i>Alnus serrulata</i> – <i>Leucothoe fontanesiana</i> Forest	Appalachian montane alluvial forest	G2?
Pls/OzHf	<i>Pinus strobus</i> – <i>Quercus (coccinea, prinus)</i> / (<i>Gaylussacia ursina</i> , <i>Vaccinium stamineum</i>) Forest	Appalachian white pine – xeric oak forest	G3
OmH	<i>Quercus alba</i> – <i>Quercus rubra</i> – <i>Quercus prinus</i> / <i>Collinsonia canadensis</i> – <i>Podophyllum peltatum</i> – <i>Amphicarpaea bracteata</i> Forest	Appalachian montane oak-hickory forest (rich type)	G3
T	<i>Tsuga canadensis</i> / <i>Rhododendron maximum</i> – (<i>Clethra acuminata</i> , <i>Leucothoe fontanesiana</i>) Forest	Southern Appalachian eastern hemlock forest (typic type)	G3 G4
Pl/OzH	<i>Pinus virginiana</i> – <i>Pinus (rigida, echinata)</i> – (<i>Quercus prinus</i>) / <i>Vaccinium pallidum</i> Forest	Appalachian low-elevation mixed pine / hillside blueberry forest	G4?
CHx	<i>Liriodendron tulipifera</i> – <i>Aesculus flava</i> – (<i>Fraxinus americana</i> , <i>Tilia americana</i> var. <i>heterophylla</i>) / <i>Cimicifuga racemosa</i> – <i>Laportea canadensis</i> Forest	Southern Appalachian cove forest (typic montane type)	G4
OzHf	<i>Quercus prinus</i> – (<i>Quercus rubra</i>) – <i>Carya</i> spp. / <i>Oxydendrum arboreum</i> – <i>Cornus florida</i> Forest	Appalachian montane oak-hickory forest (chestnut oak type)	G4 G5
OzH	<i>Quercus (prinus, coccinea)</i> / <i>Kalmia latifolia</i> / (<i>Galax urceolata</i> , <i>Gaultheria procumbens</i>) Forest	Chestnut oak forest (xeric ridge type)	G5
CHx-A-T	<i>Liriodendron tulipifera</i> – <i>Betula lenta</i> – <i>Tsuga canadensis</i> / <i>Rhododendron maximum</i> Forest	Southern Appalachian acid cove forest (typic type)	G5
Hx	<i>Liriodendron tulipifera</i> – <i>Acer rubrum</i> - <i>Robinia pseudoacacia</i> Forest	Early successional Appalachian hardwood forest	GD
HxL	<i>Liriodendron tulipifera</i> – <i>Acer rubrum</i> - <i>Robinia pseudoacacia</i> Forest dominated by <i>Liriodendron tulipifera</i>	Early successional Appalachian hardwood forest dominated by tulip poplar	GD
HI	Human Influence	Areas disturbed by human activities	Not applicable
PI	<i>Pinus virginiana</i> Successional Forest	Virginia pine successional forest	GD
Pls-T	<i>Pinus strobus</i> Successional Forest dominated by <i>Tsuga canadensis</i>	Eastern white pine successional forest dominated by eastern hemlock	GD

Source: White *et al.* 2003.

G2=Imperiled: generally 6 to 20 occurrences and/or few remaining acres or very vulnerable to elimination throughout its range due to other factor(s).

G3=Vulnerable: generally 21 to 100 occurrences. Either very rare and local throughout its range or found locally, even abundantly, within a restricted range or vulnerable to elimination throughout its range due to other factor(s).

G4= Apparently secure: uncommon, but not rare (although it may be quite rare in parts of its range, especially at the periphery). Apparently not vulnerable in most of its range.

G5= Secure; common, widespread, and abundant (though it may be quite rare in parts of its range, especially at the periphery). Not vulnerable in most of its range.

GD= Ruderal: vegetation resulting from succession following anthropogenic disturbance of an area. Generally characterized by unnatural combinations of species (primarily native species, although often containing slight to substantial numbers and amounts of alien species as well).

? = a question mark added to a rank expresses an uncertainty about the rank in the range of 1 either way on the G1 to G5 scale.

G# G# = Greater uncertainty about a rank is expressed by indicating the full range of ranks which may be appropriate. For example, a G1 G3 rank indicates that the rank could be a G1, G2, or G3.

The National Park Service has formally adopted the rating system developed by NatureServe as the definitive rating system for community vulnerability in the *Interim Technical Guidance on Assessing Impacts and Impairment to Natural Resources* (NPS 2003d). NatureServe, the former science branch of The Nature Conservancy, has designated montane alluvial forests as globally imperiled (G2) because they are very vulnerable to elimination throughout their range as a result of human land use. By definition, communities with a G2 designation are “Imperiled: Generally 6 to 20 occurrences and/or few remaining acres or very vulnerable to elimination throughout its range due to other factors.”

Over a period of several decades, The Nature Conservancy developed a national, hierarchical system of classifying vegetation. The classification is now actively managed by NatureServe. In consultation with state and federal agencies, NatureServe applies objective rarity ranking criteria to both species and vegetative communities. They have cooperative relationships with every state and their rarity ranks of species and communities serve as the accepted standard for federal land management agencies, including the National Park Service. NatureServe scientists reviewed vegetation data from Elkmont and described its forests as rare and significant, stating that “Protection of a site with remnant alluvial forest and with the potential for recovery of natural hydrologic processes would be a significant contribution to the conservation of biological diversity in the Southern Blue Ridge Mountains.” (Nature Conservancy, January 23, 1996)

The *Southern Forest Resource Assessment* was a multiagency effort that included floodplain forests as one of seven classes of critically endangered communities (U.S. Department of Agriculture, Forest Service; U.S. Environmental Protection Agency; U.S. Department of the Interior, Fish and Wildlife Service; and Tennessee Valley Authority 2002). This classification included floodplain forests with other biotic communities of documented rarity, including spruce-fir forest, wetlands, long-leaf pine, and prairies. According to the assessment, most floodplains are in private ownership and their future depends on the decisions of numerous ownerships with varying objectives that often do not include conservation.

The montane alluvial forest community type represents a late successional forest community. Because of continuous disturbance in the Elkmont environment for at least the past 100 years, including intensive lumbering operations, this plant community has been heavily impacted.

In Millionaire’s Row, the floodplain contains Appalachian montane oak-hickory forest, early successional Appalachian hardwood dominated by tulip poplar, southern Appalachian cove forest, and areas currently mapped as “human influence.” 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. If allowed the opportunity to succeed, many of the community types found within the Elkmont floodplain will transition over time into plant communities with species composition more closely resembling that of the typical condition of montane alluvial forest.

Vulnerable Associations (G3)

Appalachian White Pine – Xeric Oak Forest (PIs/OzHf). This association contains white pine (*Pinus strobus*), chestnut oak (*Quercus prinus*), and scarlet oak (*Quercus coccinea*) as dominant species, occurring singly or in combination, with each contributing between 25 percent and 75 percent of the total canopy coverage. In the Park, this forest type has a well-developed canopy and

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subcanopy. While it exists over a restricted range (based on suitable environmental conditions such as elevation and soil moisture), it is not threatened across this range.

Appalachian Montane Oak-Hickory Forest (Rich Type) (OmH). This association includes forests dominated by white oak, occurring over circumneutral soils in the southern Blue Ridge and adjacent inner Piedmont. In the Park, Appalachian montane oak-hickory forests can occur over a broad elevation range, typically from about 2000 to 4500 feet, and can occur in exposed topographic settings (upper slopes), or on more protected sites such as edges of coves. Upper Piedmont examples may be found below 1000 feet elevation. This forest type is naturally limited to richer sites in the southern Blue Ridge Mountains and adjacent inner Piedmont. Later successional, unaltered occurrences are rare. Some stands have been impacted by removal of more valuable timber species, including *Quercus alba* and other oak species, and by the loss of herbaceous species diversity from the effects of logging.

Southern Appalachian Eastern Hemlock Forest (Typic Type) (T). This community is found in forests of lower or protected slopes and terraces with eastern hemlock (*Tsuga canadensis*) occurring over a dense to patchy shrub stratum of rosebay rhododendron (*Rhododendron maximum*). In the Park, this forest is found in association with streams on low slopes with north-facing aspects. Most of the forests containing hemlock are in relatively inaccessible areas that can only be reached on foot.

Within the Park, eastern hemlock is a dominant or codominant species in seven vegetation associations and covers more than 31,500 acres. In addition, it is a secondary component and common overstory or understory species in 16 other associations covering about 15,000 acres. It is present as scattered inclusions in another 26,000 acres throughout the Park (Welch *et al.* 2002). Hemlock stands sampled in 1994 averaged 213 years of age, with a maximum age of 435 years (Yost *et al.* 1994).

Eastern hemlock is a late successional species that is long-lived, with a life span of up to 800 years. It is exceptionally shade-tolerant, and is known to be capable of surviving in the forest understory for up to 350 years (NPS 2000). The root system of the Eastern hemlock is generally very shallow, making it vulnerable to mortality during drought periods.

When present in stream and river corridors, the shade provided by hemlock trees moderates water temperatures. As a result, hemlocks in these settings are important for maintaining the habitats of cold water fish, such as brook trout. The dense foliage of hemlock forests also helps protect watersheds by slowing spring runoff, and by reducing the impact of heavy rainfall on soils by intercepting raindrops.

The occurrence of eastern hemlock forests has been substantially reduced from that of pre-European settlement (Burns and Honkala 1990; U.S. Department of Agriculture, Forest Service 2004a). Recent data indicate that the decline of eastern hemlock forests may have a significant effect on riparian ecology. When streams draining hemlock forests were compared to similar streams draining hardwood forests, data indicated that aquatic invertebrate diversity was substantially higher in hemlock forests (U.S. Geological Survey 2003a). This information highlights the potential importance of preservation and restoration of eastern hemlock forests that have been damaged or logged in the past.

Eastern hemlock forests provide habitat for a variety of mammals, birds, rodents, and other organisms, and hemlock trees are an important winter food source for a variety of wildlife. A total of 96 bird and 47 mammal species are currently known to be associated with hemlock forests in the northeastern United States (NPS 2000a). Cottontail rabbits eat shoots and needles, while seeds and needles are eaten by ruffed grouse and red squirrels (Petrides 1998). Other wildlife associated with hemlock forests include black bear, bobcat, and southern red-backed vole (Burns and Honkala 1990). Examples of birds include wild turkey, black-throated blue warbler, dark-eyed junco, blue-headed vireo, wood thrush, and ovenbird (Burns and Honkala 1990; Petrides 1998; Tennessee Ornithological Society 2002).

In the 1980s, a tiny, aphid-like insect, the hemlock woolly adelgid (*Adelges tsugae*), began threatening eastern hemlock forests. Within two decades, it was found to be infesting large forested areas, including Shenandoah National Park (NPS 2002c).

The first hemlock woolly adelgid occurrence at Great Smoky Mountains National Park was documented in May 2002. Approximately 40 infested sites have since been found, but treatment began almost immediately. The National Park Service uses three treatment methods, including two chemical and one biological method.

- The techniques employed on individual trees or those in developed, easily accessible areas incorporate the use of either an insecticide or a soap solution, or a combination of the two. The insecticide is injected into the soil where it is taken up by the roots and eventually integrated into the leafy tissues of the tree. When the insects feed on the sap of the tree, they also ingest the pesticide.
- For smaller trees, a soap solution is applied by spraying the infected areas of the tree, which kills the soft-bodied insects on contact.
- Treatment using biological control has been initiated through the propagation and release of *Sasajiscymnus tsugae*, a nonnative beetle that preys on the adelgids. This type of treatment is better suited for large, isolated areas that are not easily accessible.

Elkmont is one of many areas in the Park that has received treatment for hemlock woolly adelgid (NPS 2003c). Treatment at the District has included both insecticide soil injections and foliar application of an insecticidal soap solution.

During the past 20 years, hemlock woolly adelgid has been held primarily responsible for substantial declines detected in hemlock forests of the eastern United States. This trend has produced widespread concern among state and federal agencies that manage forested public lands. In response to an appeal from the National Park Service, the U.S. Geological Survey's Leetown Science Center, among others, has begun research to assess the potential long-term impacts of this negative development (U.S. Geological Survey 2003a).

Apparently Secure Associations (G4)

Appalachian Low-Elevation Mixed Pine / Hillside Blueberry Forest (PI/OzH). This community is found on low-elevation ridges and steep upper slopes dominated by Virginia pine. In the Park, it is found at elevations below 2300 feet on gentle to moderately steep slopes and low ridges. Sites supporting this community are exposed, typically with southern and western aspects. This community is frequently fire-suppressed and affected by southern pine beetle (*Dendroctonus*

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frontalis). As a result, it typically has standing dead trees, thick litter layers, and much understory encroachment by hardwood species.

Southern Appalachian Cove Forest (CHx). This association represents deciduous forests of concave lower slopes and flats at middle elevations (2000 to 4500 feet) in the southern Blue Ridge. In the Park, this forest is found in low, protected topographic positions, often near small streams or on gentle to moderate slopes with northerly aspects. Many of these sites were logged in the past, possibly because of their accessibility. Although it occupies sites with specific environmental conditions, this community is not rare. It is secure throughout its range, but susceptible to impacts by logging outside the Park because of its location in accessible topographic positions.

Appalachian Montane Oak-Hickory Forest (Chestnut Oak Type) (OzHf). This community is known from low to intermediate elevations of the southern Blue Ridge escarpment and Piedmont transition areas. It occurs on relatively exposed landforms below 3000 feet elevation on moderately steep to steep, convex middle to upper slopes and ridges with mostly northern to southwestern aspects. In the Park, the elevation at which this forest community is found ranges from 1650 to 2600 feet. Appalachian montane oak-hickory forests range from “apparently secure” to “secure” over their range.

Secure Associations (G5)

Chestnut Oak Forest (Xeric Ridge Type) (OzH). This community is found on xeric ridgetops in the southern Blue Ridge, ranging south and east into the upper Piedmont and north into the central Appalachians. It occurs over shallow, rocky soils, primarily on south- to west-facing slopes and ridgetops. In the Park, this community is found on middle to upper convex slopes and ridges with mostly southern and western aspects. It is found within the District and is widely distributed elsewhere in the Park.

Southern Appalachian Acid Cove Forest (CHxA-T). This association includes hemlock-hardwood forests of lower to intermediate elevations in the southern Blue Ridge and upper Piedmont, ranging from southwestern Virginia, south and west to northwestern Georgia. In the Park, this community is found on low slopes and flats, but also occurs on moderate to steep, protected slopes. It is often associated with streams, but is not classified as a wetland. Southern Appalachian acid cove forest is one of the most wide-ranging communities in the Park, occurring in most drainages from the 1840- to 3020-foot elevation range.

Ruderal Associations (GD)

Early Successional Appalachian Hardwood Forest (Hx). This plant community, including its variant that is dominated by the tulip poplar (HxL), occurs in areas that have been cleared and primarily revegetated from root and stump sprouts. Stands develop in areas that were once clearcut, used for agriculture, graded for road construction, or cleared by fire or other natural disturbances, and are dominated by early succession species. In the Park, these forests are found on low slopes and flats, typically below 3000 feet elevation and particularly in areas of heavy settlement or past logging or farming activities. Although this forest type represents early succession vegetation, many disturbed montane alluvial forests at Elkmont are now included in this association, making them a conservation priority.

Virginia Pine Successional Forest (PI). This community occurs in areas where canopy removal and intensive land use has created dry, open conditions and bare mineral soil, allowing for the establishment of Virginia pine. These habitats include old fields, old pastures, clearcuts, and burned or eroded areas. Potential sites of this community in the Park include areas below 2000 feet elevation that have been subject to disturbance by humans over the past 50 years. The Virginia pine successional forest is an early successional community that is not of conservation concern.

Eastern White Pine Successional Forest (PIs-T). This forest is an early successional forest dominated by white pine, typically with a very dense canopy and little understory. In the Park and elsewhere, it is commonly associated with human disturbance and could potentially occur anywhere within the range of the *Pinus strobus* forest alliance. The woody and herbaceous species associated with this forest type vary with geography, but are typically ruderal (species that become established in waste areas) or nonnative species that favor openings or disturbance. This forest represents early successional vegetation and is not of conservation concern.

Other Designations

Human Influence (HI). Areas classified as “HI” have been disturbed by human activities such as farming, logging, clearing for pasture, building construction, and roads. Although the vegetation communities are in the early stages of succession, the secondary classification, such as “L,” “T,” or “R,” indicates that plant species such as tulip tree, eastern hemlock, and rhododendron, respectively, are present as a secondary component. These designations provide an indication of the community type that would develop if the forest is left undisturbed. Areas dominated by tulip tree could, over time, succeed into the southern Appalachian acid cove forest or Appalachian montane alluvial forest, which is discussed as a Globally Imperiled Association (G2) in previous text within this section. Areas dominated by eastern hemlock or rhododendron may develop into the southern Appalachian eastern hemlock forest.

Distribution of Vegetation Associations within the Elkmont Historic District

The influences of prior land uses and clearing for construction of roads, buildings, and the Elkmont Campground are evident in the condition of plant communities throughout the District. Many of the area’s plant communities are described as “successional,” indicating that they are in various stages of recovery from past disturbances. The current distribution of vegetation is a result not only of disturbances such as logging and development, but is also influenced by slope, elevation, soil types, and the interactions between plants and wildlife that affect whether or not a particular plant will survive in one area or colonize another area. The distribution of plant communities found in each area of the District is discussed below.

Millionaire’s Row. Millionaire’s Row is a group of buildings located primarily between the Little River and Bearwallow Branch, with one building just south of Bearwallow Branch. The dominant vegetation association in this area is the Appalachian montane oak-hickory forest. A portion of this community along Bearwallow Branch was substantially disturbed previously by road construction, stream relocation, and construction of the cabins. Plant communities in this area include the early successional Appalachian hardwood forest dominated by tulip poplar (*Liriodendron tulipifera*) and the southern Appalachian cove forest. The canopy in Millionaire’s Row is dominated by tulip poplar, pine and oak species, and eastern hemlock (*Tsuga canadensis*). The mid-level canopy is primarily flowering dogwood (*Cornus florida*), red maple (*Acer rubrum*), and eastern hemlock.

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Sassafras (*Sassafras albidum*) is the most common sapling and rosebay rhododendron is the most frequently occurring shrub in the shrub layer. The scattered large sycamore trees (*Platanus occidentalis*) in this area indicate the presence of montane alluvial forest prior to human disturbance (Jenkins 2004).

Based on its landscape position, proximity to a major river, and residual vegetation, the floodplain area that comprises Millionaire's Row was likely the best example of montane alluvial forest within the study area prior to settlement. Also based on these conditions, this area offers the best likelihood of success for future restoration efforts for this vegetation association. Despite intensive past land use, the contemporary condition of this area suggests that, in the absence of further large-scale human disturbance, it will continue to develop into a mature montane alluvial forest (Jenkins 2004).

Wonderland Club. The Wonderland Club is comprised of a group of buildings located primarily on a ridge between the Little River and Catron Branch. The vegetation association found in this area is primarily Appalachian montane oak-hickory forest. Portions of the area also contain Appalachian low-elevation mixed pine / hillside blueberry forest, eastern white pine successional forest, and Virginia pine successional forest. Successional forests in this area are indicative of the previous disturbance from construction of roads, the Wonderland Hotel and Annex, and adjacent cabins. Some slopes in this area include dense stands of rosebay rhododendron (*Rhododendron maximum*) undergrowth.

Campground. The campground is located within and adjacent to the floodplain of the Little River on the alluvial flats below and along the lower portion of Mids Branch. The primary classification of this area is human influence, indicating that there has been and continues to be a strong human disturbance effect on the natural community. The secondary vegetation association of the campground area is early successional Appalachian hardwood forest dominated by tulip poplar. The understory is relatively sparse and the herbaceous layer is patchy because of development and the high concentration of recreational visitors. The occurrence of scattered, large sycamore trees in the campground suggests that this area, like parts of the floodplain in Millionaire's Row, was montane alluvial forest prior to human disturbance (Jenkins 2004).

Daisy Town and Society Hill. Daisy Town is located in the area between Jakes Creek and Bearwallow Branch, while Society Hill lies farther upstream along Jakes Creek and near Tulip Creek, a tributary to Jakes Creek. The structures in Daisy Town occupy much of the former forest area and most of this area is classified as human influence, which reflects the prior disturbance that occurred from logging, road construction, construction of buildings, and ongoing disturbance during the occupation of the buildings. The secondary vegetation association is early successional Appalachian hardwood forest. Lesser amounts of Appalachian montane oak-hickory forest (rich type), southern Appalachian cove forest (typic montane type), chestnut oak forest (xeric ridge type) and Virginia pine successional forest also are present.

3.2.2.3 Wetland Community Types

The National Wetlands Inventory identifies a thin strip of wetland along the Little River and characterizes the wetland as riverine; upper perennial; unconsolidated bottom, sand; and permanently flooded.

- The riverine system includes all wetlands and deepwater habitats contained in natural or artificial channels periodically or continuously containing flowing water or forming a connecting link between two bodies of standing water.
- The upper perennial system is characterized by a high gradient and fast water velocity.
- Unconsolidated bottom includes all wetlands and deepwater habitats with at least 25 percent cover of particles smaller than stones (less than 6 to 7 centimeters) and a vegetative cover less than 30 percent, while the sand designation indicates that unconsolidated particles smaller than stones are predominantly sand, although finer or coarser sediments may be intermixed.
- Permanently flooded indicates that water covers the land surface throughout the year in all years.

Five additional wetlands associated with the tributaries and floodplain of the Little River that are not shown on the National Wetlands Inventory were identified within the District. The five wetland community types were classified using *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin *et al.* 1979).

Little River Wetlands. Those wetland areas proximate to the Little River and its tributaries are classified as riverine, upper perennial, unconsolidated bottom, cobble-gravel, and permanently flooded. The steep banks and undulating floodplain along much of the river limit wetlands to areas extending just above the normal bankfull channel. Because of the scouring effect of seasonal flooding, the wetland boundary along the bank is somewhat dynamic, with wetland vegetation becoming established in areas where sediment deposition occurs as flood water recedes. The streambed and immediate stream bank generally contain only sparse areas of vegetation, with some areas colonized by dense stands of twisted sedge (*Carex torta*). The majority of vegetation growing along the Little River is dominated by upland species, including eastern hemlock, tulip tree, rhododendron, and birch species (*Betula* spp.).

Tributary Wetlands. The Elkmont Historic District contains six tributaries to the Little River, including Bearwallow Branch, Catron Branch, Mids Branch, Slick Limb Branch, Pine Knot Branch, and Jakes Creek. It also includes Tulip Creek, a tributary to Jakes Creek.

The wetland type most closely associated with the tributaries is riverine; lower perennial; unconsolidated bottom, sand; and permanently flooded. The floodplains of the Little River tributaries are more defined and contain palustrine wetlands comprised of three different wetland types.

- The first type is classified as emergent, persistent wetland, is located in highly disturbed areas, and is dominated by Japanese grass (*Microstegium vimineum*). The remainder of these emergent, persistent wetlands in less disturbed areas is dominated by sweet Joe-pye weed (*Eupatorium purpureum*), southern lady fern (*Athyrium felix-femina*), Cherokee sedge (*Carex cherokeensis*), smartweed (*Polygonum cespitosum*), and Christmas fern (*Polystichum acrostichoides*).
- The second wetland type is classified as shrub-scrub, broad-leaved deciduous wetland and is dominated by mountain laurel (*Kalmia latifolia*) and spicebush (*Lindera benzoin*) with rosebay rhododendron as a subordinate species.
- The third type is classified as forested, broad-leaved deciduous wetland, dominated by sycamore and red maple. The presence of sycamore in these wetlands is an indication that prior to disturbance, these areas may have been occupied by montane alluvial forest.

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Wetland Functions and Values. Wetlands provide a variety of potential values, depending on their position in the landscape and proximity to other plant communities, wildlife and their habitats, and people. Wetlands were assessed during the field delineation and their functions and values were categorized according to procedures described in the *Highway Methodology Workbook Supplement* (U.S. Army Corps of Engineers 1999b). This supplement is accepted by the U.S. Army Corps of Engineers as an appropriate method to evaluate the inherent functions and values provided by wetlands to humans and the environment.

The eight functions and five values that were examined in the wetland investigation included

- groundwater recharge/discharge
- flood flow alteration
- fish and shellfish habitat
- sediment/toxicant retention
- nutrient removal
- production export
- sediment/shoreline stabilization
- wildlife habitat
- recreation
- educational/scientific values
- uniqueness/heritage
- visual quality / aesthetics
- endangered species habitat

The principal functions and values of the wetlands within the Elkmont Historic District included fish and shellfish habitat, production export, wildlife habitat, recreation, and uniqueness/heritage.

- The function of fish and shellfish habitat reflects the ability of the seasonal or permanent water body associated with the wetland to provide habitat for fish and shellfish.
- The function of production export considers the ability of the wetland to produce consumable or usable products for humans or other living organisms.
- The wildlife habitat function reflects the ability of the wetland to provide habitat for a variety of animal types and species that are often found in or near wetlands.
- The recreation value of a wetland considers both consumptive and nonconsumptive types of activities and the ability of the wetland to provide opportunities for them.
- The uniqueness/heritage value reflects the ability of the wetland or its associated water bodies to supply special values.

Floodplain wetlands are important transition areas between riverine systems and the surrounding upland. They provide a unique environment for wetland plants to become established and subsequently provide habitat for a number of wetland-dependent species. Floodplain wetland vegetation aids in stabilizing soils and preventing erosion and scour during flood events. This vegetation also captures nutrients and sediments present in overland runoff before it enters surface water bodies.

The floodplain associated with the section of the Little River that flows through the District is somewhat limited because of the prior construction of roads adjacent to the river and retaining walls that prevent expansion of the floodplain. However, both the Little River floodplain wetlands and the tributary wetlands still have the ability to perform the variety of vital functions listed above.

3.2.2.4 Invasive, Nonnative Species

Current Park management policy includes treatment to eradicate nonnative species. Sixteen nonnative species have been identified in the District, some of which have been introduced into the District by former residents and now exist as cultural elements. Because of the invasive nature of these plants and the threats they pose to native populations, these species would be eradicated.

Table 3-6 lists the nonnative species that have been observed in areas of the District. These include Amur honeysuckle (*Lonicera maackii*), common mullein (*Verbascum thapsus*), Chinese yam (*Dioscorea batatas*), English ivy (*Hedera helix*), garlic mustard (*Alliaria petiolata*), Japanese barberry (*Berberis thunbergii*), kudzu (*Pueraria montana*), mimosa (*Albizia julibrissin*), multiflora rose (*Rosa multiflora*), musk thistle (*Carduus nutans*), oriental bittersweet (*Celastrus orbiculatus*), plume grass (*Miscanthus sinensis*), privet (*Ligustrum vulgare*), spiraea (*Spiraea japonica*), periwinkle (*Vinca minor*), and hemlock woolly adelgid (*Adelges tsugae*). All species listed in Table 3-6 are plants except the woolly adelgid, which is an insect that infests hemlock trees.

Table 3-6: Nonnative Species Observed in the Elkmont Historic District

Areas of the District	Nonnative Species Observed
Wonderland Club	Periwinkle, kudzu, musk thistle, Chinese yam, mimosa, and garlic mustard
Campground	Privet, common mullein, periwinkle, and Amur honeysuckle
Millionaire's Row	Privet, Japanese barberry, multiflora rose, periwinkle, English ivy, and oriental bittersweet
Daisy Town	Spiraea, kudzu and Amur honeysuckle
Society Hill	Periwinkle, spiraea, kudzu, plume grass, Japanese barberry, and Chinese yam
South of Society Hill	Hemlock woolly adelgid, Japanese barberry, and periwinkle

Source: Kichman 2004

Control methods vary by species and depend on the size and location of the plants targeted for treatment. For instance, if the target plant is close to native plant species, especially those of special concern, mechanical methods may be used rather than chemical applications to avoid the potential for overspray onto desirable native species. Management techniques include pulling (common mullein, garlic mustard, Japanese barberry, and privet), cutting (common mullein, English ivy, and Japanese barberry), applying a foliar herbicide spray (Chinese yam, English ivy, Japanese barberry, multiflora rose, plume grass, privet, spiraea, and periwinkle), applying herbicide to a cut stump (English ivy, Japanese barberry, and privet) and treating the basal portion of the woody stem with herbicide (English ivy and privet).

For treatment methods used to eradicate hemlock woolly adelgid in the District, please refer to the text on Southern Appalachian eastern hemlock forests under the heading "Vulnerable Associations (G3)", in Section 3.2.2.2, Terrestrial Communities.

3.2.3 Threatened, Endangered, Rare, and Sensitive Species

3.2.3.1 Federally Listed Species

According to the Tennessee Department of Environment and Conservation's Division of Natural Heritage (2004), there are six federally-listed species in Sevier County, which includes the District.

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None of these species, which are listed in Table 3-7, are currently known to occur in the District or the surrounding Gatlinburg quadrangle. However, because of the presence of suitable habitat, the Indiana bat has the potential to occur within the District. As shown in the table, the absence of suitable habitat makes it unlikely that any other the other species, including the spreading avens, spruce-fir moss spider, orange-footed pearly mussel, snail darter, or Carolina northern flying squirrel, occur in the District. Following the publication of the Draft Environmental Impact Statement in early 2006, the Bald Eagle was officially removed from the federal list of endangered and threatened species under the provisions of the Endangered Species Act by the U.S. Fish and Wildlife Service. Because the Bald Eagle is still considered to be a sensitive species by the State of Tennessee, the species description has been retained in this report. Brief descriptions of the life histories for the bald eagle and Indiana bat are provided below.

Bald Eagle. This large bird of prey is federally listed as threatened in the lower 48 states, although it is not federally protected in Alaska. It was downlisted from endangered to threatened in 1995. This brown bird is up to 3 feet tall, has a wingspan of approximately 6 feet, and acquires white feathers on its tail and head that give it a “bald” appearance as it matures (baldeagleinfo.com 2003). It preys mainly on fish, but will also take waterfowl, small mammals, and carrion, depending on availability.

Table 3-7: Federally-Listed Species in Sevier County, Tennessee

Scientific Name	Common Name	Habitat	Occurrence in Elkmont Historic District	Federal Status	State Status	Global Rank ^{a/}
PLANTS						
<i>Geum radiatum</i>	Spreading avens	Grows on thin, acidic soils and in cracks of cliffs with a northwest orientation at high elevations (over 4300 feet); at the bottom of rocky slopes; and infrequently in openings in heath balds.	Unlikely; the District elevation is lower than 2400 feet, habitat not suitable	Endangered	Endangered	G1
ARACHNIDS						
<i>Microhexura motivaga</i>	Spruce-fir moss spider	Coniferous forests at high elevations dominated by red spruce and Fraser fir; usually found in areas with damp moss mats on rocks and boulders that have a high level of canopy cover.	Unlikely; the District elevation is lower than 2400 feet, habitat not suitable	Endangered	Unknown	G1
MOLLUSKS						
<i>Plethobasus cooperianus</i>	Orange-footed pearly mussel	Clean, fast-flowing rivers that are medium to large in size and have a muddy, rubble, gravel, or sand substrate.	Unlikely; suitable habitat not present (large rivers with muddy substrate); no hydrologic connection to known populations	Endangered	Endangered	G1
BIRDS						
<i>Haliaeetus leucocephalus</i>	Bald eagle	Mature riparian forest.	Likely; foraging habitat present; known to occur in the Park	Threatened	D	G4
FISH						
<i>Percina tanasi</i>	Snail darter	Shallow reaches of creeks and medium-sized rivers with good water quality and cool, medium- to fast-flowing waters with a gravelly substrate.	Unlikely; no suitable habitat present (large, fast rivers)	Threatened	Threatened	G2G3

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Mammals						
<i>Glaucomys sabrinus coloratus</i>	Carolina northern flying squirrel	Habitat in the transition zone between coniferous (red spruce and Fraser fir) and northern hardwood (beech, yellow birch, maple, hemlock, red oak, and buckeye) forests; mesic forests with large, widely spaced trees, a thick evergreen shrub layer and a high number of snags.	Unlikely; habitat is not suitable	Endangered	Endangered	G5T1
<i>Myotis sodalis</i>	Indiana bat	Hollow trees, loose tree bark and crevices in cliffs, bridges, buildings, and towers for roosting; riparian forest for foraging.	Likely; foraging, roosting, and potential maternity habitat present; known to occur in the Park	Endangered	Endangered	G2

Sources: U.S. Department of the Interior, Fish and Wildlife Service 1991, 1992, 1995, and 2003; U.S. Department of Agriculture, Forest Service 2002; NatureServe 2003; North Carolina Natural Heritage Program 2003; and Tennessee Department of Environment and Conservation, Division of Natural Heritage 2003.

a/ Key for Table 3-7:

Global rank:

- G1 = Extremely rare and critically imperiled, generally with five or fewer occurrences in the world, or very few remaining individuals, or because of some special condition the species is particularly vulnerable to extinction.
- G2 = Very rare and imperiled, generally with six to 20 occurrences and fewer than 3,000 individuals, or because of some factor(s), is vulnerable to extinction.
- G3 = Very rare and local throughout its range or found locally in a restricted range, or, because of other factors, is vulnerable to extinction throughout its range; generally between 21 and 100 occurrences and fewer than 10,000 individuals.
- G4 = Apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery; viability of the species is of long-term concern.
- G5 = Demonstrably secure globally, though it might be quite rare in parts of its range, especially at the periphery.
- T# = Taxonomic subdivision (trinomial).

State Status:

- D = Deemed in need of management. Applies to any species or subspecies of nongame wildlife which the executive director of the Tennessee Wildlife Resources Agency believes should be investigated, in order to develop information relating to population distribution, habitat needs, limiting factors, and other biological and ecological data and to determine management measures necessary for their continued ability to sustain themselves successfully. This category is analogous to "Special Concern."

Nests are built in large trees and sometimes on cliffs or rock outcrops in secluded areas. A typical nest is 6 to 10 feet wide and at least 3 feet deep. Nests are rarely built at a distance greater than 2 miles from water (U.S. Department of the Interior, Fish and Wildlife Service 1995).

The past decline of the population was attributed to environmental contamination from pesticides that resulted in accumulation of toxins in adult birds, leading to reproductive failure. Environmental contaminants such as pesticides, herbicides, lead (from lead shot), and mercury in the tissues of fish continue to pose threats to eagle populations (U.S. Department of the Interior, Fish and Wildlife Service 1995). Additional threats are posed by loss and alteration of habitat because of road building, clear cutting, trail and boat launch construction, human disturbance, declining food supply and illegal shooting.

Since the 1970s, the number of breeding bald eagles has doubled every six to seven years in the contiguous United States (NatureServe 2003). Bald eagles are known to occur in all of the lower 48 states, and in 1995, there was an estimated total of 3,014 occupied bald eagle territories.

Twenty-seven counties in Tennessee, including Sevier County, have documented bald eagle occurrences. Although the Park has no record of nesting bald eagles, it contains an ample supply of preferred habitat. The Little River, which supplies high-quality water and contains a diverse array of fish species, provides potential foraging habitat and large trees near possible nesting sites in the District.

Indiana Bat. The Indiana bat is a small, brown bat that can be difficult to distinguish from its relative, the little brown bat (*M. lucifugus*). It is approximately 3.5 inches long with dull, grayish brown fur on the dorsal side, lighter brown fur on the ventral side, and a light-colored nose (North Carolina Natural Heritage Program 2003).

This bat lives in trees from spring to fall and hibernates in caves during winter. Limestone caves are the primary sites used as hibernacula, but occasionally, abandoned mines and other underground hollows are utilized (U.S. Department of Agriculture, Forest Service 2002). Hibernation occurs from early October until late March and April, and the bats roost in tightly huddled masses of 500 to 1,000 individuals (Discover Life in America, Inc. 2003). Indiana bat populations are found primarily in the midwestern and eastern United States, with the largest portion of the United States population hibernating in Indiana, Kentucky, and Missouri caves (NatureServe 2003).

In summer, males continue to use caves for roosting, while females utilize hollow trees, loose tree bark, and crevices in cliffs, bridges, buildings, and towers for roosting and raising their young (Discover Life in America, Inc. 2003; North Carolina Natural Heritage Program 2003). Groups of 25 to 100 females raise their young in clusters called colonies. A wide range of tree species are used, indicating that tree shape and condition are more important characteristics than the tree species in determining suitable maternity habitat (U.S. Department of Agriculture, Forest Service 2002). Although breeding occurs in fall, sperm is stored in the uterus of the female throughout the hibernation period until spring, when fertilization occurs. In June, females give birth to a single offspring (North Carolina Natural Heritage Program 2003).

In summer, foraging habitat consists primarily of forests near streams, but the most consistent habitat characteristic appears to be a closed canopy. Recent studies have indicated that more than 57 percent of the maternity colonies were found in forests with an 80 to 100 percent tree canopy

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and 30 percent were found in forests with an intermediate canopy (30 to 80 percent cover). The diet of Indiana bats consists of flying insects, but varies according to prey species availability (NatureServe 2003).

Since 1950, there has been a precipitous decline in the Indiana bat population nationwide, and in Tennessee, their current status is S1. This status indicates that the species is extremely rare and critically imperiled in the state with five or fewer occurrences, or very few remaining individuals, or imperiled because of some special condition where the species is especially vulnerable to extinction.

The Indiana bat was originally documented in 1937 at Park headquarters near Gatlinburg, approximately 5 miles from the Elkmont Historic District. Since then, surveys of the Blowhole Cave in Whiteoak Sink documented bat numbers ranging from approximately 2,000 to 20,000. In 1992, a smaller colony of approximately 200 Indiana bats was found hibernating in Bull Cave (Discover Life in America, Inc. 2003). Blowhole Cave and Bull Cave are both located in Blount County approximately 11 miles west of Elkmont.

Because Indiana bat colonies have been documented in the Park and because the District contains riparian habitat that is suitable for foraging, it is likely that the bats would use this habitat for foraging and, possibly, for rearing young. The District contains some areas of the closed-canopy forests that are highly favored by Indiana bats for maternity colonies and areas with an intermediate canopy that could also provide suitable habitat for females to rear their young and for roosting.

Primary threats to the continued viability of Indiana bat populations are related to disturbance of hibernacula. Disturbance to bats can be direct and intentional, such as burning, stoning, shooting, and clubbing. However, indirect, unintentional risks to the populations occurs when hibernating bats are disturbed by noise from spelunkers, tour groups, recreational explorers, and scientific researchers. Even though it does not cause immediate fatality, the physical activity initiated by this type of disturbance results in the depletion of energy stores provided by body fat that the bats need to survive winter hibernation. Consequently, bats may die before they emerge from hibernation and are able to replenish lost reserves of energy (North Carolina Natural Heritage Program 2003). Additional threats come from natural events such as flooding or ceiling collapses in caves, and from human related activities such as pesticide application, habitat degradation, and tree removal (U.S. Department of Agriculture, Forest Service 2002).

3.2.3.2 State-Listed Species

There are 55 species in Sevier County that are listed by the state of Tennessee as endangered or threatened (Tennessee Department of Environment and Conservation, Division of Natural Heritage 2004). The state-listed species include 45 plants, two birds, four fish, one reptile, two mammals, and one mollusk. Five of these state-listed species are also on the federal list of threatened or endangered species, including the spreading avens, snail darter, Indiana bat, northern flying squirrel, and orange-footed pearly mussel, and were discussed previously.

Two of the state-listed fish species, including the lake sturgeon (*Acipenser fulvescens*) and blue sucker (*Cyprinus elongates*), are not discussed in this document because they do not exist in the

District, and do not have the potential to become established in the District because of a lack of suitable habitat.

While no species on the state or federal lists of rare species for Sevier County were observed in the District, several rare species that are known to occur in other Tennessee counties were identified during field investigations in 2003 and 2004. They include butternut trees (*Juglans cinerea*), a state threatened species not listed by the state for Sevier County but known to occur in seven locations throughout the District; and Fraser's sedge (*Cymophyllus fraserianus*), a state special-concern species observed in both Society Hill and Millionaire's Row.

State-Listed Plant Species

Of the 45 state-listed plant species in Sevier County, only 15 have potential habitat in the District and eight are known to occur in the Gatlinburg quadrangle, in which the District is located. Because plants have a limited capacity to colonize areas distant from the parent plant, only those within the Gatlinburg quadrangle are being considered. The eight species include running bittercress (*Cardamine flagellifera*), rough hawkweed (*Hieracium scabrum*), Fraser's yellow loosestrife (*Lysimachia fraseri*), broadleaf bunchflower (*Melanthium latifolium*), mountain fetterbush (*Pieris floribunda*), yellow nodding lady's tresses (*Spiranthes ochroleuca*), southern nodding trillium (*Trillium rugelii*), and chamomile grapefern (*Botrychium matricariifolium*).

Running Bittercress. Running bittercress is a state threatened species that occurs in six states and only five Tennessee counties. It prefers habitat along mountain streambanks and has an S2 rank in the state (indicating it is very rare and imperiled, with six to 20 occurrences and fewer than 3,000 individuals, or because of some factor(s) that make it vulnerable to extirpation from Tennessee). It produces flowers in May and fruit in June. Primary threats to running bittercress are from disturbance of the forest herb layer, conversion of land, habitat fragmentation, and forest management practices (NatureServe 2003).

The nearest known occurrence to the District was documented in 1964, approximately 9 miles from Elkmont, south of Pigeon Forge on a steep slope near the park entrance. Although the District has no record of running bittercress occurrence, it does contain potential habitat suitable for the species.

Rough Hawkweed. Rough hawkweed is an herbaceous plant that produces yellow flowers clustered at the top of the stem. Ovate, hairy leaves are borne on hairy stems that are sometimes slightly red. Flowering occurs from June to September. It is a state threatened species with an S2 rank and is found in forests, along the perimeter, and in clearings (Nearctica.com, Inc. 2003).

The nearest known occurrence is from a 1935 record, which located the plant at Elkmont in the sterile sandy soil of an old field at an elevation of 2200 feet. Although rough hawkweed is currently not known to occur in the Elkmont Historic District, suitable habitat for the species could still be found in the area.

Fraser's Yellow Loosestrife. Fraser's yellow loosestrife is a perennial herb that grows to approximately 2.5 to 4 feet tall, produces showy flowers with five yellow petals, and bears lanceolate leaves in a whorled arrangement. Flowering occurs from mid-June to July and fruit is produced from September to October (Georgia Department of Natural Resources 1995). This

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species is listed as endangered by the state of Tennessee and is also a federal species of concern. It is found on gravel bars and shrub islands in streams and on sunny, rocky slopes and roadsides (Georgia Department of Natural Resources 1995). Because Fraser's yellow loosestrife tends to favor disturbed ecosystems, succession presents the greatest threat to populations; however, if the level of disturbance is too high, populations may not survive. Fire suppression and dam construction are the greatest threat to populations in more natural settings.

A 1935 occurrence of Fraser's yellow loosestrife was described as being located "near Gatlinburg," but no habitat information was included and the species has not been observed in the Park since (NatureServe 2003). Fraser's yellow loosestrife has been known to occur in an area near Elkmont, and the District contains disturbed areas, roadside habitat, and streams with rocky slopes favored by this species. Therefore, it is possible that Fraser's yellow loosestrife could be found in the District.

Broadleaf Bunchflower. Broadleaf bunchflower is a perennial herb that produces white flowers, an underground bulb, and long, narrow leaves. It grows to a height of 1.5 to 5 feet. It prefers habitat that occurs on slopes and in ravines, gorges, and coves with rich, moist, rocky, well-drained soils. In general, it is found at elevations from 1,000 to 5,000 feet. In Tennessee, it is only known to occur in areas of high elevation (U.S. Department of Agriculture, Forest Service 2004b). This species produces flowers from July to August and fruits from August to October. Broadleaf bunchflower is listed by the state of Tennessee as endangered.

Broadleaf bunchflower has been documented at four sites in the Gatlinburg quadrangle, including Sugarland Mountain, at Huskey Gap Trail, on the Foothills Parkway in a small ravine between the two branches of Mill Creek, and on the west side of a ravine, west of Crooked Arm Ridge. The closest sites are at Sugarland Mountain and Huskey Gap Trail, approximately 2 to 4 miles east of Elkmont. Because the District contains the rocky, well-drained soils and slopes favored by broadleaf bunchflower, it is possible that the species could be found in the area. In addition, because known occurrences are within several miles of the District, new plants could potentially become established in the area if seeds were transported by wildlife or on the clothes or shoes of people moving from one area to the other.

Mountain Fetterbush. Mountain fetterbush is a state threatened species with a rank of S2. This erect, broadleaf, evergreen shrub grows to a height of 3 to 7 feet and produces fragrant, white flowers easily visible above the dense foliage of the shrub. It generally occurs on balds at high elevations (U.S. Department of Agriculture, Forest Service 2004c). Flowering occurs from May to June and fruit is produced from August to October.

A 1956 occurrence was documented across from Park headquarters, approximately 5 miles from Elkmont. However, the District does not contain the high elevation bald habitat favored by mountain fetterbush. Therefore, it is highly unlikely that the species would be found within the District.

Yellow Nodding Lady's Tresses. Yellow nodding lady's tresses is a state endangered species that prefers moist mountain woods habitat. Flowering occurs from September to October and fruits are produced during the same period. Only four counties in Tennessee have documented occurrences of this orchid. It has a state rank of SH, indicating it may be extirpated from Tennessee.

Yellow nodding lady's tresses have been known to occur on hillsides in dry, sandy soil in the vicinity of Elkmont and at Fighting Creek Gap in the Park. The District includes areas of moist mountain woods habitat preferred by yellow nodding lady's tresses and the species has been documented as occurring approximately a mile from the District at Fighting Creek Gap. Therefore, a population of yellow nodding lady's tresses could potentially exist within the District or may become established in the future.

Southern Nodding Trillium. Southern nodding trillium is an herbaceous plant with large, white flowers. It can be distinguished from similar species by the pendulous quality of the flowers that hang below its leaves. Unlike the northern species, the pistil and stamens on southern nodding trillium are purple. It is found in rich, non-acid, open hardwood forests at an elevation of approximately 3,000 feet (Dudley 1998-2002). It is listed as a state endangered species and has a flowering period that occurs between April and May, with fruit produced from May to July.

Southern nodding trillium has been known to occur at the Park in the vicinity of the Holston Assembly Grounds near Mynatt Park, approximately 5 miles from the District. Although southern nodding trillium has been documented as occurring in the surrounding area, the District is located entirely at elevations of 2400 feet or lower. Therefore, Elkmont does not contain habitat suitable for southern nodding trillium, and the species is not likely to be found in the District.

Chamomile Grapefern. Chamomile grapefern is a perennial, herbaceous, nonflowering plant with thick leaves that grows to a height of 4 to 12 inches. Its preferred habitat is moist, partially shaded, coniferous forests or slopes in deciduous forests (Williams 1990). Reproduction is by sporulation that occurs from June to August (Tennessee Department of Environmental Conservation, Division of Natural Heritage 2003).

This fern is a state special-concern species known to occur in only three counties in Tennessee, including Sevier County. It is considered critically imperiled in the state of Tennessee and has a global rank of G5, indicating it is secure globally (NatureServe 2005). Three populations have been documented in the Park, including one located near the Little River in the Millionaire's Row area of the Elkmont Historic District.

State-Listed Wildlife Species

Compared to endangered or threatened plant species, which have limited ability to colonize new areas, the more mobile animals of special concern have the potential to move into the District from an area wider than the surrounding Gatlinburg quadrangle. Therefore, this analysis included federally and state-listed species that are known, or have the potential, to occur in Sevier County. In addition to the federal species discussed previously, special-concern wildlife species that could find suitable habitat in the District include the common raven (*Corvus corax*), peregrine falcon (*Falco peregrinus*), North American river otter (*Lontra canadensis*), longhead darter (*Percina macrocephala*), and northern pine snake (*Pituophis melanoleucus melanoleucus*). These species are discussed below.

Common Raven. The common raven is a large, black bird that is listed as a state threatened species with a rank of S2. This rank indicates the species is very rare and imperiled within the state, with 6 to 20 occurrences or few remaining individuals, or because of some factor(s) making it vulnerable to extinction.

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The common raven is an omnivorous bird that eats carrion and insects such as maggots and beetles that feed on carrion. Other animal foods include small mammals, reptiles, frogs, young or wounded birds, and some invertebrates. Plant foods consist of grains, acorns, and cherries. This bird is active during the day and gregarious, sometimes roosting in large flocks. Breeding occurs in winter and eggs are laid in late February or early March. The female incubates three to six eggs, but after hatching, the young are cared for by both parents (University of Michigan 1995-2003).

The raven is found in a variety of habitats that include riparian lowlands to mountains, but it usually prefers areas that contain hills or mountains, especially those with steep rock faces. Vegetation varies from hardwoods and coniferous forests to more open grasslands and shrubby areas. Nests are built on rocky outcrops, in coniferous trees, or on man-made structures such as bridges and billboards (NatureServe 2003). Major threats to this species are related to humans and include harassment, poisoning (from ingestion of poisoned animal remains) and becoming caught in traps set for other animals (University of Michigan 1995-2003).

The common raven has been known to occur in Sevier County, but not in the Gatlinburg quadrangle. It has been found in a wide range of habitats that include the hardwood and coniferous forest types that are found in the District. Therefore, the District contains potential habitat that could support individuals or populations of common ravens.

Peregrine Falcon. In Tennessee, the peregrine falcon is considered extremely rare and critically imperiled, with five or fewer nonbreeding occurrences or very few remaining individuals, or because of some special condition in which the species is particularly vulnerable to extinction (S1N rank). This bird of prey has pointed wings, a black cap, white throat, pale breast with brown bars, and vertical black bands extending from the eyes down the neck. The feet are large and strong and the bill is hooked, allowing it to carry and tear its prey into pieces (Wisconsin Department of Natural Resources 2003).

The peregrine falcon preys mainly on small- to medium-sized birds that include a variety of songbirds and waterfowl, but it will sometimes eat small mammals, lizards, fish, and insects (NatureServe 2003). In urban settings, it has been known to consume large numbers of pigeons and starlings, but tends to be an opportunistic hunter, taking whatever prey is available (Wisconsin Department of Natural Resources 2003).

Peregrine falcons occupy a wide range of habitats that include coniferous and hardwood forests, cliffs, deserts, shrublands, riparian wetlands, tidal flats, tundra, and cities as long as there are suitable nesting ledges. Nests are usually constructed on cliff shelves or holes in steep rocky slopes. However, peregrine falcons may also nest on riverbanks, in open bogs, on large stick nests constructed by other bird species, in holes in trees, and on man-made nesting platforms or structures, including tall buildings, bridges, and quarries (NatureServe 2003).

The decline of peregrine falcon populations after the mid-1950s was attributed to extensive use of pesticides, particularly DDT. Research linked the pesticides to reduced estrogen and calcium levels, which resulted in thin-shelled eggs that were not strong enough to hold the weight of the incubating parent. Although DDT has been banned in the United States, it is still used in countries where the birds spend the winter (Wisconsin Department of Natural Resources 2003). In addition to threats from persistent pesticides and other contaminants in the environment, threats include habitat loss, shooting by hunters, and poaching of young in the nest.

Thirteen Tennessee counties, including Sevier County, have records of peregrine falcon occurrences. There are two known occurrences of peregrine falcons in the Park, one at Greenbrier Pinnacle and the other at Alum Cave. The most recent sighting was at Greenbrier Pinnacle, approximately 15 miles from Elkmont. In April 2004, a pair of peregrines were observed displaying behaviors indicating that they were in the midst of egg incubation (NPS 2004g). Because the District does not contain the cliff habitat favored for nesting, it is unlikely that peregrine falcons would rear their young in the area. However, the area includes a variety of bird species suitable as prey for the peregrine falcon. Therefore, it is possible that the peregrines nesting in the Park might use the District for hunting.

North American River Otter. The North American river otter is a state-listed threatened species with a rank of S3, signifying that the species is rare and uncommon, with 21 to 100 documented occurrences. This medium-sized mammal has a long, narrow body; short legs; a wide, flat head with a broad nose; and small, rounded ears. The feet are webbed and the wide, tapered tail is used as a rudder when the otter is swimming. The fur is brownish, short, and dense on most of the body except on the throat where it is grayish-white. Otters have distinctive facial whiskers that are highly sensitive to physical contact (Discover Life in America, Inc. 2002).

River otters' prey consists primarily of slow moving or schooling nongame fish such as cyprinids, suckers, chubs, shiners, catfish, and perch. They will also prey on crustaceans, amphibians, insects, small birds, waterfowl, mammals, and plants. The river otter is mainly active at night, but also in early morning and late afternoon (Hill 2001).

River otters live in a variety of aquatic habitats, including streams, lakes, ponds, swamps, and marshes (Discover Life in America, Inc. 2002). Young are raised in tree cavities, dense shrubs near rivers, undercut streambanks, tall marsh grasses, holes under tree roots, or dens excavated or constructed by other animals (Hill 2001). The North American river otter is widely distributed from Alaska and Canada throughout the United States, except in parts of the southwest.

In the Park region, the species was historically common, but by the time the Park was established, river otters were rare because of unrestricted trapping. From 1986 to 1994, a reintroduction program was conducted that included release of approximately 137 individuals relocated from North Carolina, South Carolina, and Louisiana. Historical records exist for an occurrence near Sugarlands Visitor Center, and since the reintroduction program was initiated, there have been sightings at Abrams Creek, Hazel Creek, and at Elkmont (Discover Life in America, Inc. 2002). Because the river otter has been sighted in the District fairly recently, and there is ample stream habitat available, it is likely that the species currently lives in or near the District.

Longhead Darter. The longhead darter is a threatened species in Tennessee with a rank of S2, indicating it is very rare and imperiled with 6 to 20 known occurrences or few remaining individuals, or because of some factor(s) that make it vulnerable to extinction. It is also a federal species of concern.

This small fish has a long, tapered head; a distinctive pattern of continuous black patches along the upper half of the body; a black spot on the caudal fin; and a mark below each eye. Habitat for the longhead darter consists of clean, medium-sized rivers with high-velocity stream flow and riffles with a rocky substrate or pools with minimal turbidity (Pennsylvania Department of Conservation and Natural Resources 2003).

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Life history and accurate population data are lacking because of the difficulty in sampling this fish with conventional methods. However, researchers believe spawning occurs from March to May. The eggs and larvae are vulnerable to predation because they are left to develop without any parental protection or rearing. For the young that survive, sexual maturity is attained in approximately two years. The population appears to be at risk primarily from sedimentation that reduces reproductive success, chemical contamination, and dam construction (NatureServe 2003).

The longhead darter is not known to occur in the Gatlinburg quadrangle, but it has been documented in Sevier County. The portion of the Little River that flows through the District is medium-sized, with some of the characteristics preferred by this species. Therefore, although the longhead darter is not known to occur in the District, there is potential habitat for the species and it is possible that the longhead darter may occur there in the future.

Northern Pine Snake. The northern pine snake is a large snake with a threatened species status in Tennessee and a rank of S3. This snake, with wide dark bands, can reach a length of approximately 8 feet and has a range that includes northern Georgia and Alabama, most of South Carolina, and parts of Tennessee, North Carolina, Mississippi, West Virginia, Virginia, and New Jersey (Conservation Southeast, Inc. 2004).

The northern pine snake is able to excavate tunnels and spends much of its time underground. It is thought to prefer large areas of upland habitat with some canopy cover, considerable ground cover, and limited human disturbance. However, natural fire disturbance seems to be important for maintaining its habitat. This nonvenomous snake preys on small mammals, rodents, and birds by wrapping itself around the prey and causing suffocation. It lays eggs in underground nests that are usually located in open areas with sandy soils (New Jersey Division of Fish and Wildlife 2004). Major threats to the population are lack of fire, habitat fragmentation, and land development (Conservation Southeast, Inc. 2004). Additional risks stem from human disturbance, such as the use of off-road vehicles and indiscriminate killing (NatureServe 2003).

A historical record of occurrence was from Norton Creek near Gatlinburg, approximately a mile north of the Park boundary and 5 miles from the District. A more recent record of occurrence is from the NPS Headquarters office in Gatlinburg, approximately 7 miles from the District (Nichols 2004). Because this area is somewhat similar to Elkmont in topographical elevation, the pine snake may occur in the sandy, dry ridges that surround the District.

3.2.3.3 *Rare Species and Species of Concern*

There are 18 federal species of concern listed by the U.S. Fish and Wildlife Service that are known to occur in Sevier County, Tennessee (U.S. Department of the Interior, Fish and Wildlife Service 2004). The Tennessee Department of Environment and Conservation (2004) also has 36 plants, 13 mammals, 6 birds, 1 amphibian, 3 fish, and 1 mollusk on its list of rare species for Sevier County. As shown in Table 3-8, some of the species are found on both of these lists. This table also provides information on these species' habitat requirements and potential for occurrence in the District.

These species have no official federal status and are not protected under the provisions of the Endangered Species Act. However, both the U.S. Fish and Wildlife Service and Tennessee Department of Environment and Conservation request that agencies avoid impacting these species

because they are rare and could eventually be elevated to state or federal listing as threatened or endangered if they continue to decline in numbers.

3.2.3.4 Other Species Considered: Synchronous Fireflies

There are 14 species of fireflies in the Park. None of these species are federally or state-listed. However, synchronous flashing is exhibited by one species, *Photinus carolinus*. Large numbers of male fireflies gather in June and fly over the ground searching for mates. As they fly, the group simultaneously emits flashes of light for six to eight seconds with breaks of up to 10 seconds. Females may counter with a less intense flash from the ground (Omara-Otunnu 2003).

Photinus carolinus appears to occur at elevations of at least 2000 feet in the Great Smoky Mountains and north into Pennsylvania (Milius 1999). The District contains some of the sites in the Park where *Photinus carolinus* has been observed. The grassy areas near creeks and rivers and other open grassy areas at Elkmont provide suitable habitat that supports large numbers of the fireflies.

The firefly larvae are predaceous, with primary prey items that include earthworms, snails, and slugs. They may also feed on dead invertebrates. Habitat for larvae consists of decaying woody or leafy organic matter along streambanks and pond shorelines, and in open meadows. Adults prefer habitat similar to the larvae (Branham 1998).

3.2.4 Surface Water

3.2.4.1 Hydrology

The primary waterway traversing the Elkmont Historic District is a tributary of the Tennessee River known as the Little River. The Little River flows in a northwest direction and has a channel length of 22.4 miles within Park boundaries. Gradients along the river range from about 50 feet per mile downstream from Elkmont to as much as 360 feet per mile in the steep headwater tributaries.

The main channel is perennial, with mean monthly discharges that range from about 125 cubic feet per second during base-flow conditions in September to 525 cubic feet per second at high flow in March. From 1964 to 1995, average annual runoff from the basin was 36.6 inches (Mast and Turk 1999).

Table 3-8: Rare Species of Sevier County, including Federal Species of Concern and State Special-Concern Species

Scientific Name	Common Name	Federal Status	State Status	Habitat Requirements	Habitat Available in the District	Identified in or near the District
Plants						
<i>Acer saccharum ssp leucoderme</i>	Chalk maple	Not listed	Special concern	Circumneutral rocky woods	Yes	No
<i>Acrobolbus ciliatus</i>	Liverwort	Not listed	Special concern	Spruce-fir forests and moist ravines on rocky substrate	No	No
<i>Agrostis mertensii</i>	Arctic bentgrass	Not listed	Special concern	Mountain balds and moist ravines	No	No
<i>Anastrophyllum saxicola</i>	Liverwort	Not listed	Special concern	High elevation rocky peat, heath, and wet rocks	No	No
<i>Botrychium matricariifolium</i>	Chamomile grapefern	Not listed	Special concern	Mountain woods and thickets	Yes	Yes
<i>Cacalia rugelia=Rugelia nudicaulis</i>	Rugel's ragwort	Federal species of concern	Endangered	High elevation open woods	Yes	No
<i>Calamagrostis cainii</i>	Cain's reed grass	Federal species of concern	Endangered	High elevation rock outcrops and slide areas	No	No
<i>Cardamine clematidis</i>	Mountain bittercress	Federal species of concern	Threatened	In and along rocky streams	Yes	No
<i>Cardamine flagellifera</i>	Running bittercress	Not listed	Threatened	Mountain streambanks	Yes	No
<i>Cardamine rotundifolia</i>	Roundleaf watercress	Not listed	Special concern	Wet soils, swamps, or flowing water	No	No
<i>Cephaloziella spinicaulis</i>	None	Not listed	Special concern	Crevices of rock outcrops	Yes	No
<i>Clintonia borealis</i>	Clinton's lily	Not listed	Special concern	High-elevation mesic forests	No	No
<i>Cymophyllus fraserianus</i>	Fraser's sedge	Not listed	Special concern	Mixed mesophytic forests	Yes	Yes
<i>Entodon concinnus</i>	Lime entodon	Not listed	Special concern	Moist, calcareous rocks	No	No
<i>Euonymus obovatus</i>	Running strawberrybush	Not listed	Special concern	High elevation woods	Yes	No
<i>Glyceria nubigena</i>	Smoky Mountains manna grass	Federal species of concern	Threatened	Mountain balds and open seeps	No	No
<i>Grimmia olneyi</i>	Grimmia moss	Not listed	Special concern	Dry rocks and cliffs at high elevations	No	No
<i>Hieracium scabrum</i>	Rough hawkweed	Not listed	Threatened	Old field sandy soils	Yes	Historically

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Scientific Name	Common Name	Federal Status	State Status	Habitat Requirements	Habitat Available in the District	Identified in or near the District
<i>Hymenophyllum tayloriae</i>	Gorge filmy fern	Not listed	Special concern	Gorges, waterfall spray zones, moist ceilings of cliff crevices, and narrow stream gorges	No	No
<i>Lejeunea blomquistii</i>	Blomquist leafy liverwort	Not listed	Special concern	Mid-elevation gorges on rock or bark	Yes	No
<i>Listera smallii</i>	Appalachian twayblade	Not listed	Special concern	High elevation swamps or bogs	No	No
<i>Lysimachia fraseri</i>	Fraser's yellow loosestrife	Federal species of concern	Endangered	Dry open woods	Yes	No
<i>Megaceros aenigmaticus</i>	Megaceros	Not listed	Special concern	Mid-elevation streams on wet, shaded rocks	Yes	No
<i>Melanthium latifolium</i>	Broadleaf bunchflower	Not listed	Endangered	Slopes and ravines with rich, moist, rocky, well-drained soils	Yes	Yes
<i>Menziesia pilosa</i>	Minniebush	Not listed	Special concern	Heath balds and cliffs	No	No
<i>Mielichhoferia elongata</i>	Moss	Not listed	Special concern	Woods above 5000 feet	No	No
<i>Milium effusum</i>	Tall millet grass	Not listed	Special concern	Rich woods	Yes	No
<i>Orthodontium pellucens</i>	Translucent orthodontium	Not listed	Special concern	Soil peat or rock in heath balds	No	No
<i>Panax quinquefolius</i>	American ginseng	Not listed	Special concern	Rich woods	Yes	No
<i>Pieris floribunda</i>	Mountain fetterbrush	Not listed	Threatened	Balds at high elevations	No	No
<i>Plagiochila corniculata</i>	Liverwort	Not listed	Special concern	Mature Fraser fir and mountain ash bark	No	No
<i>Plagiochila sharpii</i>	Sharps leafy liverwort	Not listed	Special concern	Shaded, moist ledges and bluffs	Yes	No
<i>Plantanthera psycodes</i>	Small purple fringed orchid	Not listed	Special concern	Wet woods and bog margins	Yes	No
<i>Prunus virginiana</i>	Choke cherry	Not listed	Special concern	Moist coves and slopes	Yes	No
<i>Saxifraga caroliniana</i>	Gray's saxifrage	Federal species of concern	Endangered	Rocky woods	Yes	No
<i>Silene ovata</i>	Mountain catchfly	Federal species of concern	Endangered	Rich woods	Yes	No
<i>Spiranthes ochroleuca</i>	Yellow nodding lady's tresses	Not listed	Endangered	Moist mountain woods	Yes	Yes

Scientific Name	Common Name	Federal Status	State Status	Habitat Requirements	Habitat Available in the District	Identified in or near the District
<i>Streptopus roseus</i>	Rosy twisted stalk	Not listed	Special concern	Wet cliffs and mountain woods	Yes	No
<i>Tetradontium brownianum</i>	Little Georgia	Not listed	Special concern	Montane rocky seeps and falls	Yes	No
<i>Thelypteris phegopteris</i>	Northern beechfern	Not listed	Special concern	Cliffs and ravines on shaded streambanks in partial shade of rich, moist woodlands	Yes	No
<i>Trillium rugelii</i>	Southern nodding trillium	Not listed	Endangered	Rich, non-acid, open hardwood forests	No	No
<i>Zanthoxylum americanum</i>	Northern prickly ash	Not listed	Special concern	Moist woods and thickets	Yes	No
Mammals						
<i>Condylura cristata</i>	Star-nosed mole	Not listed	State vertebrate species of concern	Low, wet ground near lakes or streams	Yes	No
<i>Lontra canadensis</i>	North American river otter	Not listed	Threatened	Streams, lakes, ponds, swamps and marshes	Yes	Yes
<i>Microtus chrotorrhinus carolinensis</i>	Southern rock vole	Not listed	State vertebrate species of concern	Cool, moist, rocky woodlands	Yes	No
<i>Myotis leibii</i>	Small-footed bat	Federal species of concern	State vertebrate species of concern	Hemlock forests, in caves and mines	Yes	No
<i>Napaeozapus insignis</i>	Woodland jumping mouse	Not listed	State vertebrate species of concern	Forested or brushy areas near water, wet bogs, or stream borders	Yes	No
<i>Neotoma floridana haematoreia</i>	Eastern woodrat	Federal species of concern	State vertebrate species of concern	Talus slopes, rocky outcrops, bluffs, crevices, and caves	Yes	No
<i>Parascalops breweri</i>	Hairy-tailed mole	Not listed	State vertebrate species of concern	Sandy loam with good vegetative cover; not heavy, wet soils	Yes	No
<i>Plecotus rafinesquii</i> = <i>Corynorhinus rafinesquii</i>	Rafinesque's big-eared bat	Federal species of concern	State vertebrate species of concern	Buildings, caves, and trees with hollows and/or exfoliating bark	Yes	No
<i>Sorex cinereus</i>	Common shrew	Not listed	State vertebrate species of concern	Moist areas in forests, open areas, and brushlands	Yes	No
<i>Sorex dispar</i>	Long-tailed or rock shrew	Not listed	State vertebrate species of concern	Cool, moist rocky areas in deciduous forests and mixed deciduous-coniferous forests	Yes	No
<i>Sorex fumeus</i>	Smoky shrew	Not listed	State vertebrate species of concern	Hemlock forests with deep litter layer	Yes	No
<i>Sorex longirostris</i>	Southeastern shrew	Not listed	State vertebrate species of concern	Open fields and woodlots; prefers moist areas	Yes	No

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Scientific Name	Common Name	Federal Status	State Status	Habitat Requirements	Habitat Available in the District	Identified in or near the District
<i>Sorex palustris punctulatus</i>	Water shrew	Federal species of concern	State vertebrate species of concern	Bogs or montane alluvial forests	Yes	No
<i>Synaptomys cooperi</i>	Southern bog lemming	Not listed	State vertebrate species of concern	Low, damp bogs and meadows with heavy growth of vegetation	Yes	No
Birds						
<i>Accipiter striatus</i>	Sharp-shinned hawk	Not listed	State vertebrate species of concern	Coniferous, deciduous, or mixed forests and open woodland	Yes	No
<i>Contopus cooperi</i>	Olive-sided flycatcher	Not listed	State vertebrate species of concern	Coniferous, deciduous, or mixed forests and woodlands	Yes	No
<i>Corvus corax</i>	Common raven	Not listed	Threatened	Riparian lowlands to mountains, prefers steep rock faces	Yes	No
<i>Falco peregrinus</i>	Peregrine falcon	Not listed	Critically Imperiled	Cliffs and steep rocky slopes	No	Yes
<i>Haliaeetus leucocephalus</i>	Bald eagle	Delisted	State vertebrate species of concern	Forests and woodlands near medium to large rivers, lakes, or other bodies of water	Yes	No
<i>Lanius ludovicianus migrans</i>	Migrant loggerhead shrike	Federal species of concern	Not listed	Open brushy areas, meadows, pastures, orchards, and thickets along roads	Yes	No
<i>Limnothlypis swainsonii</i>	Swainson's warbler	Not listed	State vertebrate species of concern	Forested wetland; coniferous, hardwood, or mixed forests; shrubland or chaparral	Yes	No
<i>Sphyrapicus varius</i>	Yellow-bellied sapsucker	Not listed	State vertebrate species of concern	Riparian areas; coniferous, hardwood or mixed forests; suburban areas	Yes	No
<i>Tyto alba</i>	Common barn owl	Not listed	State vertebrate species of concern	Herbaceous wetlands, cliffs, cropland, hedgerows, grasslands, savannah, suburban areas	No	No
Amphibians						
<i>Cryptobranchus alleganiensis</i>	Hellbender	Federal species of concern	State vertebrate species of concern	Clear, fast-flowing streams and rocky bottom rivers	Yes	Yes
<i>Desmognathus wrightii</i>	Pigmy salamander	Not listed	State vertebrate species of concern	Spruce-fir forests, hardwood forests at lower elevations	Yes	No
<i>Eurycea junaluska</i>	Junaluska salamander	Federal species of concern	State vertebrate species of concern	Rocky areas along streams	Yes	No

Scientific Name	Common Name	Federal Status	State Status	Habitat Requirements	Habitat Available in the District	Identified in or near the District
Reptiles						
<i>Pituophis melanoleucus melanoleucus</i>	Northern pine snake	Not listed	Threatened	Sandy, dry ridges	Yes	Yes
Fish						
<i>Carpodes velifer</i>	Highfin carpsucker	Not listed	State vertebrate species of concern	Medium to large rivers and creeks, oxbows, sloughs, and ponds with sand or gravel substrate and medium to fast current	Yes	No
<i>Cycleptus elongates</i>	Blue sucker	Federal species of concern	Threatened	Swift flowing, large river habitats with high turbidity; sometimes in reservoirs	No	No
<i>Etheostoma acuticeps</i>	Sharphead darter	Federal species of concern	Not listed	Large, fast-flowing creeks with riffles and chutes; medium rivers with coarse gravel rubble or boulder substrate	Yes	No
<i>Percina aurantiaca</i>	Tangerine darter	Not listed	State vertebrate species of concern	Creeks and small rivers with moderate to steep gradient; clear, moderately deep, rocky pools below riffles	Yes	No
<i>Percina macrocephala</i>	Longhead darter	Federal species of concern	Threatened	Fast riffles of clear, small to medium rivers	Yes	No
<i>Phoxinus tennesseensis</i>	Tennessee dace	Not listed	State vertebrate species of concern	Spring-fed streams in ridge and valley limestone region	No	No
Mollusks						
<i>Io fluviialis</i>	Spiny riversnail	Federal species of concern	Not listed	Small streams or rivers with strong currents and limestone outcrops	No	No

Sources: NatureServe 2003; Tennessee Department of Environmental Conservation 2004; U.S. Department of the Interior, Fish and Wildlife Service 2004.

The Tennessee Department of Environmental Conservation monitors a site on the Little River that is characteristic of the middle reaches of the watershed. The width varies from 25 to 40 feet, and the maximum depth is 2.4 feet. The site has approximately 85 percent canopy-cover and a streambed substrate that consists primarily of boulders (60 percent), cobbles (30 percent), and gravels (10 percent). The river also has occasional pools that contain some bedrock, silt, and organic debris.

3.2.4.2 Water Quality Standards

One of the responsibilities of the Tennessee Department of Environmental Conservation, Division of Water Pollution Control is the adoption of water quality standards, including the approval of water quality criteria. In Tennessee, the criteria determine the level of water quality protection for each designated use. Those uses include fish and aquatic life protection, recreational use, domestic water supply, industrial water supply, irrigation, wildlife and livestock watering, and navigation.

The highest level of water quality protection is awarded to streams and lakes designated Outstanding National Resource Waters. Streams are nominated for Outstanding National Resource Waters status because they

- have important habitat for ecologically significant populations, including rare, threatened, or endangered species
- offer specialized recreational opportunities
- have outstanding scenic or geologic values
- have very high existing water quality

Tennessee's Water Quality Control Act also contains an anti-degradation statement that protects existing uses of all surface waters as established under the act.

In 1997, four streams within the Park were nominated and subsequently selected as Outstanding National Resource Waters. They include the Little River (whose entire watershed is within Park boundaries), Abrams Creek, West Prong Little Pigeon River, and Little Pigeon River. These streams also are significant regionally.

With assistance from the U.S. Environmental Protection Agency, personnel from the Tennessee Department of Environmental Conservation, Division of Water Pollution Control are subdelineating ecoregions within the state and characterizing water quality at selected reference streams as part of the Ecoregion Reference Stream Monitoring program (NPS 2002b). A sampling site on the Little River within the District was selected as a reference site as part of the program to aid in implementing water quality standards. Information from the stream will help establish clean water goals for other streams in the Blue Ridge Mountains ecoregion.

3.2.4.3 Water Quality near the Elkmont Historic District

The National Park Service operates water quality monitoring stations along the Little River both upstream and downstream from the Elkmont Historic District. According to information provided by the National Park Service, no appreciable degradation of the water quality currently occurs between these monitoring locations.

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The Elkmont Historic District sampling site is located near the gate across Little River Road. Habitat assessments, physical measurements, and chemical and biological samples were collected beginning in 1996. Ten habitat parameters were evaluated, including epifaunal substrate/available cover, embeddedness, velocity/depth regime, sediment deposition, channel flow status, channel alteration, riffle frequency, bank stability, vegetative protection, and riparian zone vegetative width.

Each habitat parameter is given a numeric ranking from 0 to 20, with 20 being the highest level. The top score possible is 200, and the Little River sampling site scores ranged from 193 to 197. Some points were lost at this site because there is very little slow velocity/shallow depth habitat and because the stream occasionally experiences low flows (NPS 2002b).

Mast and Turk (1999) collected and analyzed 61 water quality samples at a station on the Little River as part of the U.S. Geological Survey's Hydrologic Benchmark Network. The U.S. Geological Survey flow gauging station is located on the Little River approximately 7.5 miles downstream from Elkmont in Blount County. Fourteen Hydrologic Benchmark Network sampling sites are located in the watershed, including one within the District boundary and one just upstream from the boundary. Table 3-9 lists instantaneous discharge, median concentrations and ranges of major constituents in stream water collected at the gauge, and volume-weighted mean concentrations in wet-only precipitation measured at the National Atmospheric Deposition Program station near Elkmont Campground.

Atmospheric deposition of sulfate, nitrate, and hydrogen in the Southern Blue Ridge Province is among the highest reported in the eastern United States. Based on more than 15 years of recorded data, the volume-weighted mean pH of precipitation measured at the Elkmont National Atmospheric Deposition Program station was an acidic 4.5. The dominant cations in precipitation were hydrogen, which contributed 63 percent of the total cation charge, and ammonium, which contributed 20 percent. Sulfate and nitrate were the dominant anions, accounting for 65 and 29 percent, respectively, of the total anions (Mast and Turk 1999).

Water in the Little River is dilute and weakly buffered. The pH ranges from 6.4 to 7.7, with a median that is near neutral (6.9), unlike the precipitation, which tends to be acidic. The dominant stream water cations were calcium and sodium, and the dominant anion was alkalinity. The low concentrations of compounds derived from weathering, particularly alkalinity, are attributed to the weathering-resistant sandstones and quartzite of the underlying Precambrian bedrock. The median chloride concentration in stream water (14 microequivalents per liter) is approximately four times higher than the value weighted mean concentration of chloride in precipitation. The difference between average annual runoff and precipitation suggests that evapotranspiration accounts for about a twofold increase in the concentration of precipitation. This implies that as much as half of the stream-water chloride may be derived from sources other than precipitation.

Table 3-9: Physical and Chemical Water Quality Results for the Little River, 1985–1995, and for Wet Precipitation Collected at the Elkmont Station, 1980-1994

Parameter	Stream Water						Precipitation (volume weighted mean)
	Minimum	First quartile	Median	Third quartile	Maximum	Number of Samples	
Discharge, instantaneous (cubic meters per second)	1.0	2.8	5.1	8.5	20	57	Not reported
Specific conductance, field (microsiemens per centimeter at 25° centigrade (µs/cm))	9.6	14	17	20	61	56	Not reported
pH, field, std. units	6.4	6.8	6.9	7.2	7.7	56	4.5 (lab only)
Calcium (microequivalents per liter (µeq/L))	48	65	75	87	190	59	4.5
Magnesium (µeq/L)	23	30	34	38	70	59	1.4
Sodium (µeq/L)	19	39	44	48	61	59	2.7
Potassium (µeq/L)	7.7	13	13	15	26	59	0.9
Ammonium (µeq/L)	<0.7	<0.7	<0.7	1.4	3.6	59	10
Alkalinity, laboratory (µeq/L)	60	96	120	140	260	59	Not reported
Sulfate (µeq/L)	25	35	42	58	130	59	34
Chloride (µeq/L)	8.5	11	14	17	49	59	3.1
Nitrite plus nitrate (µeq/L)	<3.6	9.7	11	14	31	56	15 (nitrate only)
Silica (micromoles per liter)	83	90	95	110	120	58	Not reported

Taking into account the cumulative effects of evapotranspiration and inputs of sulfate in dry deposition, these data suggest that a considerable portion of atmospherically deposited sulfate remains in the basin. Adsorption on clays and organic matter in the soil environment is the most likely means for retention of sulfate (Mast and Turk 1999).

The stream contains lower concentrations of both nitrate and ammonium when compared to precipitation, indicating the Little River basin is an important sink for nitrogen compounds. In contrast, data from streams at higher elevations in the Park show nitrate concentrations similar to those in precipitation. The retention of both sulfate and nitrate in the Little River Basin is likely a significant contributing factor in buffering stream water from the effects of acidic deposition (NPS 2002b) at low elevations in the Park.

A separate sampling program was conducted at points upstream, within, and downstream of the District during a 10-year period from 1993 to 2003 when the National Park Service collected quarterly water quality samples from three stations. The sampling site located the farthest downstream from the District is near Metcalf Bottoms, approximately 10 miles downstream from the Elkmont station. The middle sampling station is near the intersection of Elkmont Road and Little River Road. The uppermost sampling site is upstream from the District near the Cucumber Gap Trail. A summary of the data collected from these stations is provided in Tables 3-10 through 3-12.

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Table 3-10: Little River Water Quality at Metcalf Bottoms

Parameter	Units	Minimum	Average	Median	Maximum	No. of Samples
Hydrogen	µeq/L	0.08	0.32	0.30	0.89	46
Conductivity	µs/cm	11.45	15.45	15.47	21.00	44
pH	none	6.14	6.55	6.52	7.10	46
Calcium by IC	µeq/L	24.22	86.75	87.30	124.02	38
Calcium by AA	µeq/L	0.00	59.97	67.75	82.09	9
Magnesium by IC	µeq/L	17.52	30.49	30.77	58.31	38
Magnesium by AA	µeq/L	20.49	26.07	26.58	29.63	9
Sodium	µeq/L	24.34	38.68	39.69	50.61	46
Potassium	µeq/L	4.58	12.36	12.33	19.10	46
Ammonium	µeq/L	0.00	0.28	0.00	7.76	46
Sulfate	µeq/L	25.68	34.55	33.63	63.22	46
Chloride	µeq/L	6.40	15.17	13.39	38.01	46
Nitrate	µeq/L	0.00	8.82	8.49	29.52	46

Source: McGill Associates 2004

Table 3-11: Little River Water Quality at Elkmont Road and Little River Road

Parameter	Units	Minimum	Average	Median	Maximum	No. of Samples
Hydrogen	µeq/L	0.11	0.40	0.37	1.08	36
Conductivity	µs/cm	6.40	14.20	13.83	20.70	36
pH	none	5.97	6.45	6.44	6.95	36
Calcium by IC	µeq/L	23.75	71.56	73.04	142.96	24
Calcium by AA	µeq/L	23.70	57.00	60.05	70.15	13
Magnesium by IC	µeq/L	12.98	28.89	24.82	96.90	24
Magnesium by AA	µeq/L	7.74	22.41	24.20	25.93	13
Sodium	µeq/L	10.40	36.54	36.41	55.34	36
Potassium	µeq/L	3.19	12.39	11.24	19.81	36
Ammonium	µeq/L	0.00	2.02	0.00	47.00	36
Sulfate	µeq/L	11.62	31.72	32.44	41.92	36
Chloride	µeq/L	4.52	18.02	17.29	37.90	36
Nitrate	µeq/L	0.00	9.48	10.56	19.32	36

Source: McGill Associates 2004

Table 3-12: Little River Water Quality at Cucumber Gap Trail

Parameter	Units	Minimum	Average	Median	Maximum	No. of Samples
Hydrogen	µeq/L	0.14	0.47	0.45	1.25	38
Conductivity	µs/cm	10.92	13.18	13.22	19.90	38
pH	none	5.90	6.36	6.35	6.85	38
Calcium by IC	µeq/L	20.75	60.73	52.90	102.89	24
Calcium by AA	µeq/L	37.75	52.51	50.45	74.00	15
Magnesium by IC	µeq/L	12.57	22.82	21.02	46.89	24
Magnesium by AA	µeq/L	19.42	21.69	21.40	23.65	15
Sodium	µeq/L	13.69	34.93	36.19	69.62	38
Potassium	µeq/L	4.77	11.31	10.59	19.46	38
Ammonium	µeq/L	0.00	1.06	0.00	19.21	38
Sulfate	µeq/L	27.36	32.84	32.47	45.36	38
Chloride	µeq/L	10.77	17.94	15.09	42.46	38
Nitrate	µeq/L	0.00	11.86	12.00	23.07	38

Source: McGill Associates 2004

In stream waters downstream from Elkmont, neither chloride nor nitrate concentrations were elevated, evidence that the wastewater discharge from Elkmont does not adversely affect water quality during periods of low visitor use in the Park. Stream water nitrate concentrations in the Park vary seasonally, with the highest concentrations in winter and spring and the lowest concentrations in autumn. The uptake of nitrogen by microorganisms may play a major role in reducing nitrogen concentrations during the early stages of leaf fall (NPS 2002b).

Although most of the constituents sampled at the three locations show a slight increase from the highest sample point in the watershed at Cucumber Gap down to the lowest sample point at Metcalf Bottoms, it does not appear that the District has a substantial impact on surface water quality. In fact, for the parameters presented in the tables, most values for the Little River exceed standards established by the state of Tennessee for drinking water by a large margin (Tennessee Department of Environmental Conservation, Division of Water Pollution Control 2004). Because the data shown in Tables 3-10 to 3-12 are fairly consistent among the sampling locations, no appreciable degradation of the water quality in the Little River is apparent between the water quality monitoring locations. A reasonable conclusion is that there is currently no measurable degradation of water quality occurring as a result of activities occurring in the District.

Thermal Effects of Wastewater Discharge

The wastewater treatment plant discharges its treated effluent into the Little River at river mile 49.6. The discharge has been entering the Little River at this location for more than 30 years. The quality and quantity of the discharge is well documented during this period in the monthly operation reports and the discharge monitoring reports that are prepared by the plant operator for the National Park Service and submitted to the Tennessee Department of Environment and Conservation in accordance with the National Pollutant Discharge Elimination System permit.

A record of the temperature of the effluent wastewater and of the Little River at the point of discharge is not required in the discharge permit or for the operation of the treatment plant. Therefore, there are no historic temperature data at this location.

According to NPS records, the wastewater temperature in the wastewater treatment plant as it enters the discharge pipe varies seasonally from an average of approximately 63 degrees Fahrenheit (°F) during the spring and fall months to an average of approximately 72°F during the summer months. Based on water temperature data collected during the past 40 years from two U.S. Geological Survey gauging stations located upstream and downstream of the wastewater discharge point, the average river water temperature is 57°F during the spring months, 67°F during the summer months, and 51°F during the fall months. The average temperature differential of the wastewater in the treatment plant and the water in the river varies from 5°F to 12°F.

The wastewater leaves the treatment plant through an 8-inch-diameter underground pipe that has a moderate slope for approximately 40 feet, and then levels out for approximately 70 feet to the discharge point in the river. The discharge pipe outlet is submerged under the river water surface in a swiftly flowing channel that appears to be the deepest part of the river channel at that location. The 70-foot-long, flat section of discharge pipe leading to the river remains surcharged with river water at all times.

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The discharge flow from the wastewater treatment plant to the river is intermittent. The plant is designed such that the settling clarifier flow is pumped intermittently into the disinfection basin and then flows by gravity to the river. Therefore, wastewater is discharged to the Little River only when the discharge pump is operating. Because the discharge pumping capacity rate is 40 gallons per minute, this is the rate of discharge during the pumping cycles, with no discharge going to the river when the pump is not operating. For example, when the daily flow through the plant is 10,000 gallons, the discharge enters the river intermittently for a total of only 250 minutes (4.2 hours) during the 24-hour day. At the Elkmont wastewater treatment plant's design flow of 35,000 gallons per day, the discharge would be occurring at the same rate of 40 gallons per minute for a total of 14.6 hours over a 24-hour period.

Because of the existing configurations and operating characteristics of the treatment plant, some cooling of the wastewater occurs in the discharge pipe between the plant and the actual discharge into the Little River. This cooling occurs in the section of discharge pipe that lies at a flat grade below the water level in the river. This section of pipe is surcharged with cooler river water when the discharge is not occurring, which lowers the temperature of the wastewater as it intermittently flows through the pipe. At a 40-gallon-per-minute flow rate, the velocity in the pipe is approximately 0.25 feet per second, allowing a residence time of the wastewater in the pipe of approximately 4.6 minutes.

Field measurements were taken of wastewater temperature as it flows out of the treatment plant immediately before it exits the pipe at the submerged discharge point in the river. The temperature of the wastewater in the pipe leaving the plant was 63.3°F. The temperature of the wastewater in the pipe 2 feet before entering the river was 61.5°F, and 61 °F at the end of the pipe that discharges into the river. These measurements were taken after the discharge pump had been operating for about 45 minutes, so that the interior surface of the discharge pipe had already warmed to a more stable temperature. The wastewater residence time in the discharge pipe was recorded at 4 minutes and 50 seconds, which confirms the rate of discharge at approximately 40 gallons per minute.

Water temperature in the river at the same submergence elevation as the discharge pipe was measured both upstream and downstream from the discharge pipe. The river temperature approximately 3 feet upstream was 58.8°F. Downstream temperatures were taken at distances of 1, 2 and 3 feet from the discharge pipe and were found to be 59.7°F, 58.9°F, and 58.8°F, respectively. Under these conditions, the warmer temperature of the wastewater was dissipated entirely within 3 feet of the discharge point. With the constant discharge rate and the relative stability of the heat transfer rate, it is reasonable to conclude that under the range of seasonal temperatures of both the wastewater and river water, the thermal effects of the wastewater discharge would not measurably vary from the existing conditions, regardless of the daily discharge from the plant.

3.2.5 Floodplains

Floodplains function to store floodwater following heavy rain events. By allowing a more gradual release of the storm water, floodplains can reduce the downstream rates and velocities of flows, reduce the amount of erosion, and allow suspended sediments to settle out. Vegetation within floodplains provides nutrient and sediment filtration while stabilizing soils and providing wildlife habitat for a variety of terrestrial and aquatic wildlife.

The capacity of floodplains to provide protection depends on a number of factors relating to the hydrology of the area. Some of those factors include the location of the floodplain relative to its watershed, whether flood storage is provided upslope of the floodplain, whether the watershed contains a high percentage of impervious surfaces, whether hydric soils are present, and the density of vegetation.

The District is traversed by two primary waterways, the Little River, and its tributary, Jakes Creek. Other, smaller waterways in the District include Bearwallow Branch, Tulip Branch, Catron Branch, Mids Branch, Pine Knot Branch, and Slick Limb Branch. The Little River drainage basin above the confluence with Jakes Creek consists of approximately 39 square miles of generally steep, rugged, forested terrain.

Research related to existing floodplain mapping in this area revealed that existing Flood Hazard Boundary Maps did not include coverage of the District area. While the existing Flood Insurance Rate Maps did provide coverage, the accuracy of this information was questionable. Therefore, the watershed was modeled to determine the maximum anticipated runoff from the 100-year storm event for the District. The modeling effort used the U.S. Geological Survey's National Flood Frequency computer software (version 3.0), a topographic map developed specifically for the District, and the HEC-RAS engineering software (version 3.1.1). This method demonstrated the approximate floodplain limits in a manner compatible with Federal Emergency Management Agency standards. The resulting 100-year floodplain boundary is shown on the Existing Condition and alternatives maps provided in Chapter 2 (Figures 2-1 through 2-8).

The results of the modeling indicated that the existing bridge structures over the Little River within the District are adequate to pass the volume of runoff created by the 100-year storm event. In addition, the bridge over Jakes Creek along the upper end of Jakes Creek Road (above the Kuhlman cabin (#40)) is adequate to pass the designated storm event. However, the drainage culverts located along Bearwallow Branch (at Jakes Creek Road and Daisy Town Loop Road) are not adequate to pass the required volume of water during the 100-year storm event. As a result, storm water from such an event would be detained behind these structures and would overtop the roads at these locations. The modeling also indicated that the Miller cabin (#46), Young cabin (#48), Faust cabin (#47) and garage, and minor portions of the lower levels to the rear of some of the Society Hill cabins along Jakes Creek lie within the 100-year floodplain.

None of the project alternatives under consideration contain facilities or improvements that would encroach in the 100-year floodplain on or above the ground surface. The alternatives would include subsurface water and wastewater lines that would cross the floodplain area to reach cabins within Millionaire's Row and as subaqueous crossings of Jakes Creek. There also would be water and wastewater lines crossing the Campground Bridge and the Jakes Creek Cemetery Bridge in some of the alternatives, but these lines would be attached to these bridges above the 100-year flood elevation. Because none of the encroachments described above would impact the regulatory floodplain, there is no need to remodel the floodplain to perform impact analyses in Chapter 4.

3.2.6 Air Quality

The Clean Air Act of 1970 established national policy for protection, preservation, and enhancement of air quality. The 1977 Clean Air Act Amendments offered the highest level of air

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quality protection to national parks with areas greater than 6,000 acres. These areas, including Great Smoky Mountains National Park, are designated Class I areas.

Additional means of achieving this level of protection were provided in the 1990 Amendments to the Act. The Clean Air Act requires that federal land managers take responsibility for ensuring that air quality and air quality-related values in Class I areas are not degraded. Land managers are also required to actively protect, preserve, and enhance their park's resources (NPS 2004h).

Over the past 24 years, air quality research and monitoring in the Park has indicated that emissions carried into the Park by wind and air currents have substantially impacted Park resources, visitor satisfaction, and public health. The primary source of emissions is the burning of fossil fuels such as coal, oil, and gas, which produces sulfur dioxide and nitrogen oxides. Those primary pollutants chemically react with other compounds in the environment to produce secondary pollutants that include sulfates, nitrates, and ozone (NPS 2004h).

Great Smoky Mountains National Park has one of the most comprehensive air quality monitoring programs in the national park system. The current program includes nine weather stations, three atmospheric deposition sites, and seven air quality monitoring stations, one of which is located within the Elkmont Historic District. The following sections describe visibility, ground-level ozone and acid precipitation, which are important indicators of air quality.

3.2.6.1 Visibility

Visibility is recorded as the distance one can see in miles. Over that past 50 years, visibility in the Park has decreased approximately 80 percent in summer and 40 percent in winter (NPS 2004h). While average yearly visibility at the Park is 25 miles, it would be more than four times that distance (113 miles) without the influence of human development. At times, visibility has dropped to less than one mile (NPS 2001b).

Many pollutants contribute to reductions in visibility, but sulfur dioxide (SO₂) is the primary contaminant of concern. Sulfur dioxide emissions from coal-burning power plants react chemically with other atmospheric compounds to produce miniscule sulfate particles. These particles scatter light and substantially contribute (83 percent) to reduced visibility (NPS 2004h).

In 1999, the U.S. Environmental Protection Agency instituted the Regional Haze Rule that mandates a return to natural conditions for visibility on the haziest days by 2064 and preservation of the current high visibility days. In fall 2001, the Tennessee Valley Authority announced that controls for sulfur dioxide emissions would be installed on three power plants closest to the Park. These controls are anticipated to reduce sulfur dioxide emissions from those plants by more than 95 percent.

3.2.6.2 Ozone

Ground-level ozone is not the same as the protective ozone layer in the upper atmosphere that prevents the sun's harmful ultraviolet rays from reaching the earth. Ozone at ground level is produced during sunny conditions when nitrogen oxides combine with hydrocarbons (NPS 2001c).

The quality of air in the Great Smoky Mountains National Park largely reflects ambient ozone levels. Ozone at the ground level has many direct impacts. In humans and animals, oxidants in ozone can cause eye, nose, and throat irritation. Chronic exposure to high ozone levels can result in loss of lung function. Ozone can also oxidize plant material and can, in conjunction with its associated pollutants, result in reduced visibility. Therefore, it is critical to minimize ozone concentrations whenever practical. Table 3-13 presents historical data on ozone levels in the Park.

Table 3-13: Great Smoky Mountains National Park Ozone Concentrations (1997 to 2001)

Location	Largest 1-hour ozone concentrations, by year in parts per billion				
	1997	1998	1999	2000	2001
Look Rock, 1st Max.	117	135*	125*	111	96
2nd Max.	115	120	123*	108	93
3rd Max.	115	119	117	102	93
4th Max.	110	118	117	100	91
Cades Cove, 1st Max.	102	106	116	98	93
2nd Max.	99	101	102	97	88
3rd Max.	99	100	101	92	87
4th Max.	95	97	100	89	87

Source: McGill Associates 2004.

*Exceeds National Ambient Air Quality Standards.

The National Ambient Air Quality Standard for ozone was a 1-hour concentration of 120 parts per billion. In past years, including 1998 and 1999, there have been violations of that standard within the Park. However, data indicate that ozone levels in the Park have been trending downwards in the recent past, and no violations of ozone standards occurred during 2000 or 2001. This trend is consistent with efforts being made in Tennessee to reduce statewide nitrogen oxides (NO_x) emissions. The 1999 nitrogen oxides emission inventory showed about 2,022 tons per day of nitrogen oxides being emitted in Tennessee, while the 2007 emission inventory projection shows only 1439 tons per day of nitrogen oxides (McGill Associates 2004).

While vehicles do not emit ozone directly, they emit nitrogen oxides and volatile organic compounds (VOCs) that react in the sunlight of the atmosphere to form ozone. As a result, ozone is a regional pollutant that depends on variables such as precursor pollutant emissions (mainly nitrogen oxides and volatile organic compounds) and weather, including the amount of sunshine, air temperature, cloud cover, humidity, and wind speed and direction (McGill Associates 2004).

When ozone reaches 85 to 104 parts per billion at ground level, it can adversely affect the health of people who are active outdoors, especially children and those with respiratory illnesses. Harmful effects on people include coughing, sinus inflammation, chest pains, throat irritation, lung damage, and compromised immune system (NPS 2001c). Studies have shown that even healthy people who exercise or otherwise physically exert themselves in areas with high ozone levels experience a reduction in lung capacity over the short term (NPS 2002d). Consequently, the U.S. Environmental Protection Agency recommends that people, especially children and those with respiratory illnesses, limit their outdoor activity time when ozone reaches those levels (NPS 2002d). The data in Table 3-13 indicate that ozone concentrations in the Park have consistently been above the level at which they are known to be harmful to humans.

3.0 AFFECTED ENVIRONMENT

Adverse impacts to vegetation also have been documented. Field surveys have revealed that 90 species of plants in the Park show the symptoms of damage that typically are related to ozone exposure. Controlled studies indicate that the levels of ozone in the Park are harmful to 30 species of plants. Generally, higher ozone levels and greater damage to leaves has been observed at higher elevations in the Park. In addition, reduced growth rates have been observed in specific plant species such as yellow poplar and black cherry (NPS 2001b).

Recently, the U.S. Environmental Protection Agency revised the air quality standard for ozone to provide increased protection for human health, lowering the compliance level from 120 parts per billion for a one-hour period to 80 parts per billion averaged over an eight-hour period. In response to a proposal from the governors of Tennessee and North Carolina, the entire Park was designated nonattainment for the 8-hour ozone National Ambient Air Quality Standards on April 15, 2004. Consequently, steps must be taken to reduce emissions from both stationary and mobile sources in the nonattainment counties. Plans were required by June of 2007, and attainment must be achieved by 2009 (NPS 2004h).

3.2.6.3 *Acid Precipitation*

The acidity of water is expressed as the pH, a measure of hydrogen ion concentration. The pH is a log-base-10 scale from 0 to 14 in which a neutral solution, such as pure water, has a pH value of 7.0. Values lower than 7.0 are considered acidic, while those above 7.0 are alkaline (North Carolina State University 2004).

The pH of uncontaminated rainwater is 5.0 to 5.6 (slightly acidic). The pH of rainfall in the Park averages 4.5, approximately 5 to 10 times more acidic than normal rainwater. Clouds with pH levels as low as 2.0 have been documented in areas of high elevation forests in the Park (NPS 2001c). In addition to acid deposition from clouds and rainwater, these contaminants also derive from dry particulate matter.

Acid deposition causes increased levels of nitrates in soils that can adversely impact vegetation and aquatic organisms. Most streams at high elevations in the Park have little buffering capacity to neutralize acids formed from sulfur and nitrogen emissions. In addition, acid deposition has resulted in nitrogen saturation of soils, an effect that has been associated with the loss of calcium in Park soils. The reduction in this important nutrient can adversely impact vegetation and stream ecology. Acidic soils also cause the release of aluminum that can potentially harm vegetation by inhibiting nutrient absorption (NPS 2001b).

3.3 INTERPRETATION AND VISITOR USE

3.3.1 Visitor Experience

Visitor use in Great Smoky Mountains National Park is likely to continue to increase, as it has historically since the Park opened in June 1934. The location of Elkmont, close to highways and the Park's north boundary, has made it one of the Park's more heavily used areas.

Visitors to the Park have wide-ranging expectations for their experience at the Park and a number of factors shape the quality of that experience. Some of these factors are based on demographics such as age, level of education, race or ethnicity, and gender. However, much of what a visitor experiences at the park is based on personality, motivation, and past experience, while other factors relate to social or cultural conditions.

The opportunities for diverse visitor experiences are determined largely by the variety, attractiveness, and accessibility of the natural and cultural resources to visitors and to the relationship of these resources to the Park's purpose and significance. Expectations for quality recreation experiences are different for various user groups, and they change over time. This can sometimes result in contention between individuals or groups for whom quiet and solitude is a primary concern and other groups who desire enhanced facilities and organized programs. Those who participate in organized programs will naturally have more interactions with other visitors. The quality of the visitor experience can also be affected by the amount of available support facilities (such as parking lots, information centers, or rest rooms), the extent to which these facilities are crowded, and the availability of necessary information.

Within the boundaries of the Elkmont Historic District, a wide variety of recreational opportunities are provided by the diversity of the land, area, and facilities. Primary uses by visitors to the District include:

- camping
- day hiking
- fishing
- swimming
- canoeing/kayaking
- conducting research
- driving and walking through the cabin area
- birding
- wildflower and wildlife viewing
- ranger-led walks
- campfire programs
- photography
- picnicking
- fall leaf-change viewing
- cross-country skiing

3.0 AFFECTED ENVIRONMENT

3.3.2 Visitor Facilities

Ample opportunities for both active and passive recreational activities exist within the District. Primary uses of the resources found in the District consist of trail use and access, camping, backcountry pursuits, water-based activities, educational programs, and driving or walking through areas with historic buildings. The Little River is one of the most scenic streams in the Park and has excellent trout fishing opportunities. The District includes a campground, a campground contact station, and several trails. The Little River provides opportunities for fishing, tubing, swimming, and paddling activities, and the campground can accommodate tents and recreational vehicles and trailers for overnight stays.

The campgrounds and trails provide very high-quality exposure to the natural and cultural resources of the Smoky Mountains and draw visitors to this portion of the Park. The District's cabins and other contributing structures provide opportunities for visitors to gain insights into the District's historical and architectural development. Although many of the trails are on the logging railroad grades and former roads, the surrounding forest continues to recover from prior human use impacts. The trail system at Elkmont provides access to high-elevation scenery for the hardest of hikers. The easy grade of the Little River Trail makes it a popular hike for novice overnight backpackers (Minnigh 2002).

3.3.2.1 *Elkmont Campground*

Elkmont Campground is one of the most highly used sites for camping in the Park. In recent years, approximately 36 to 40 percent of the visitors staying in Park campgrounds used the Elkmont Campground. According to historical and recent data, 40 to 50 percent of the visitors enter the District primarily to access their campsite at the Elkmont Campground (NPS 1987-1993; 2002a; 2002-2003). Of more than \$1 million generated by camping sales at the Park, Elkmont contributed approximately 44 percent.

The Elkmont Campground first opened shortly after the Park was established. It was expanded in the 1950s and, as part of the Mission 66 movement, was formally developed in the 1960s. (Mission 66 was a 10-year construction program that began in the mid-1950s. Its goal was to improve facilities and reduce overcrowding in the national parks by 1966, the 50th anniversary of the National Park Service.) Mission 66 construction projects in Great Smoky Mountains National Park included construction of campgrounds and park housing, road improvements, and utility upgrades (Brown 2000).

In 1964, the number of campsites at Elkmont was reduced from between 360 and 400 sites to 338 sites, each with a larger area. This change was implemented to improve the camping experience. Sometime after 1971, the sites were reduced from 338 to 240. In the 1990s, the number of sites was again reduced and today, there are 220 campground sites. Because of federal budget limitations, the camping season at Elkmont recently was reduced from year-round operation to the nine months from March to November (NPS 2002a).

Even with these changes, visitation to the campground remains high. Even though the visitor use period was reduced by 25 percent (admittedly during the winter), the campground still has an average annual visitation of between 88,000 and 100,000 people. Table 3-14 presents total visitation to the Elkmont Campground for the period from 1987 through 2006.

Table 3-14: Visitation to the Elkmont Campground, 1987 to 2006

Year	Total Number of Visitors
1987	151,631
1988	182,935
1989	122,534
1990	170,502
1991	146,469
1992	138,236
1993	113,242
1994	113,251
1995	109,158
1996	104,534
1997	117,562
1998	107,722
1999	107,620
2000	104,403
2001	98,242
2002	93,918
2003	98,601
2004	92,230
2005	88,062
2006	91,927

Source: NPS 2002-2006

3.3.2.2 Trails

The trail system originating from the Elkmont area includes 15 trails, shown in Table 3-15. These trails provide opportunities for hikers of all experience levels. The 0.8-mile-long Elkmont Nature Trail is self-guided and provides educational opportunities in combinations with an easy walk. Trails for visitors on horseback are also available.

Almost 65 miles of trails can be accessed directly from trailheads in the District. Using this trail network, hikers can plan loop hikes of varying lengths, or can use trail connections to access other areas of the park. As a result of this extensive trail system, use by day and overnight hikers constitutes a substantial proportion of all recreational uses for the area.

Seasonal trends in trail use are similar to those for use of other facilities in the Park. The lowest use occurs from November to March and peak use occurring during the summer months from June to August.

3.0 AFFECTED ENVIRONMENT

Table 3-15: Trails and Access Points in Elkmont Historic District

Trail Name	Use Type	Length (miles)	Access Point
Little River	Hiking	6.2	Parking area near campground
Jakes Creek	Hiking, horseback riding	3.3	Parking area near campground
Curry Mountain	Hiking	3.3	Little River Road Trailhead and Meigs Mountain Trail
Cucumber Gap	Hiking	2.4	Little River and Jakes Creek Trails
Goshen Prong	Hiking	7.6	Little River Trail
Huskey Gap	Hiking	4.1	Little River Trail
Elkmont Nature	Hiking	0.8	Little River Road
Meigs Mountain	Hiking, horseback riding	6.1	Jakes Creek Trail
Miry Ridge	Hiking, horseback riding in lower half only	5.0	Jakes Creek Trail
Rough Creek	Hiking	2.8	Little River Trail
Sugarland Mountain	Hiking	11.9	Rough Creek and Huskey Gap Trails
Meigs Creek	Hiking	3.5	Meigs Mountain Trail
Panther Creek	Hiking, horseback riding	2.2	Jakes Creek Trail
Lynn Camp Prong	Hiking, horseback riding	3.7	Miry Ridge Trail
Middle Prong	Hiking, horseback riding	1.8	Panther Creek and Lynn Camp Prong Trails

Source: NPS 2002a

3.3.2.3 Backcountry Pursuits

The policy of requiring permits for all backcountry camping dates back at least to the early 1950s. By 1969, the Park had 18 backcountry shelters and maintained 713 miles of trails (NPS 1969). In 1972, a rationing system for camping along the Appalachian Trail and other popular trails within the Park was implemented. Rationing was instituted to address problems of large numbers of visitors camping in and around shelters, which was creating substantial resource damage and crowding (Schlatter 1972; NPS 1975).

The General Management Plan (NPS 1982b) identified 478,184 acres (93 percent) of the Park lands as being within the “Natural Zone,” which effectively constitutes the Park’s backcountry area. In 1983, the first advanced reservation and first-come/first-serve requests for backcountry camping were introduced (Click 1983). By 1993, the number of backcountry sites had grown to 84 designated sites (51 open to horses, 15 rationed) and 18 shelters (13 open to horses, all rationed). That year, the Park reported 96,459 backcountry overnight stays, representing the sixth highest backcountry use within the national park system (NPS 1993).

Patterns of annual use, based on backcountry sites accessed from the Elkmont Campground in 2001, are provided in Table 3-16. These monthly use levels for overnight stays are derived from the self-registration records submitted at Elkmont Campground. In the year 2000, an estimated 857 cars parked overnight at the two trailheads in the District for an average of two nights each. This estimate is based on use figures for the seven backcountry campsites accessed from these two trailheads. Little River Trailhead receives 61 percent of this overnight parking use (Minnigh 2002).

**Table 3-16: Estimated Backcountry Use for Overnight Stays
for Trips Originating at the Elkmont Campground by Month, 2001**

Month	Average Number of Permits ^{a/}	Average Number of Users*	Total Camper-Nights / Permits
January	14	37.2	83.1
February	33	87.6	195.8
March	73	193.8	433.2
April	49	130.1	290.8
May	92	244.3	546
June	101	268.2	599.3
July	55	146	326.4
August	43	114.2	255.2
September	50	132.8	296.8
October	79	209.7	468.7
November	29	77	172.1
December	27	71.7	160.2
2001 Totals	645	1,712.6	3,827.6

Source: NPS 2002a

a/ Average of seven backcountry sites derived from self registration records from the Elkmont Campground.

Currently, there are 102 designated backcountry sites, eight of which are in the vicinity of the Elkmont Historic District. Four camping shelters (Derrick Knob, Silers Bald, Double Spring Gap, and Mount Collins) are accessible from the Jakes Creek and Little River Trailheads. Campers using these campsites register for overnight use by completing a camping permit at one of the 13 self-registration stations in the Park. Most of the permits for these campsites are issued through the Sugarlands and Elkmont Campground permit stations (Minnigh 2002). While detailed records have not been kept for every backcountry site, records for sites 23 and 24 were found dating back to 1995 (Table 3-17). Backcountry sites are accessed via the Goshen Prong and Little Creek Trails (Gray 2002).

The system of trails in the vicinity of the District provides very high-quality exposure to the natural resources of the Smoky Mountains and is a main draw for hikers to this portion of the Park. The trail system provides access to high-elevation scenery for the hardest hikers, while the easy grade of Little River Trail makes it a popular hike for novice overnight backpackers to reach the lower-elevation backcountry campsites.

3.0 AFFECTED ENVIRONMENT

Table 3-17: Backcountry User Trends for Sites 23 and 24, 1995 through 1999

Year / Site		Annual Camper-Nights (rationed)	Total Annual Camper-Nights (rationed and unrationed)	Park-Wide Total Annual Camper-Nights	Percent of Park Total Camper-Nights
1995	Site 23	1,002	1,433		
	Site 24	1,064	1,522		
Total for both sites		2,066	2,955	94,542	3.1%
1996	Site 23	1,128	1,613		
	Site 24	1,819	2,601		
Total for both sites		2,947	4,214	102,385	4.1%
1997	Site 23	1,155	1,652		
	Site 24	1,722	2,463		
Total for both sites		2,877	4,115	92,851	4.4%
1998	Site 23	1,246	1,782		
	Site 24	1,646	2,354		
Total for both sites		2,892	4,136	95,977	4.3%
1999	Site 23	1,203	1,720		
	Site 24	1,627	2,327		
Total for both sites		1,830	4,047	92,994	4.4%
Total (1995-1999)		13,612	19,465	478,749	

3.3.2.4 Water-Based Activities

Because the Little River and its tributaries are central features in the District landscape, water-based activities attract a number of visitors. Fishing drew visitors to the Smoky Mountains well before creation of the Park. The Little River has some of the best trout fishing in the region.

Originally, the native brook trout was present in most streams above 2,000 feet elevation. However, trout numbers declined because of the effects of competition with nonnative species and because of watershed damage from extensive logging operations in the early 1900s that caused the loss of trout habitat in some locations. Removal of trees overhanging the stream banks of water bodies throughout the area resulted in loss of shade and higher water temperatures than brook trout are capable of tolerating. Massive disturbance of vegetation and soils resulted in erosion of the denuded hillsides and sediment inflow into the streams. This damage to stream habitat resulted in extirpation of the brook trout from about 50 percent of its original range. Brook, brown, and rainbow trout were stocked in Smoky Mountain streams by logging companies, private citizens, and the state of Tennessee prior to Park establishment.

Both fly and spin anglers use the waters of the Little River near the roadside leading to Elkmont Campground and in other areas along the river. For the 7-year period between 1987 and 1993, the average annual number of people fishing within the District was 2,096, with a peak in 1988 of 4,142 (NPS 1987-1993).

In addition to fishing, the waters that run through the Elkmont Historic District are used for swimming, canoeing and kayaking, and floating in inner tubes. Each year, about 3,000 swimmers, 150 canoeists or kayakers, and more than 2,000 tubers participated in water-based activities from or within the District.

3.3.2.5 Educational Programs

The intent of the visitor use program is to enhance visitors' appreciation of the Park's natural, cultural, and aesthetic values by providing opportunities for resource related activities (NPS 1982b). Visitors to the Park have certain expectations of the types of experiences they desire and feel are acceptable in a national park setting. The types of experiences available in the Park are centered primarily on appreciation of natural and cultural resources and species diversity.

Drafted in 1918 by the National Parks Educational Committee to encourage educational opportunities in national parks, the following objectives are among the earliest expressions of NPS founders concerning park management:

- to educate the public in respect to the nature and quality of the national parks
- to further the view of the national parks as classrooms and museums of nature
- to use existing publicity and educational systems so as to produce a wide result
- to combine in one interest the sympathy and activity of schools, colleges, and citizen organizations in all parts of the country
- to study the history and science of each national park and collect data for future use

From the earliest days of the Park, its extensive and varied resources have served as the backdrop for research and learning. The Park provides a practical outdoor laboratory for scientists of multiple disciplines as well as classrooms for children experiencing the sensory pleasures, magnitude of the mountains, and rich diversity of the Park's natural communities for the first time.

In recognition of the need to educate the visiting public on significant resources within the Park, the National Park Service developed a *Comprehensive Resource Education Plan* (NPS 2001a) that defined resource education themes and described a variety of programs offered through the resource education program. The intent of these programs is to provide opportunities for the public to learn about the history and existing condition of the Park. As described in the *Comprehensive Resource Education Plan's* park visitor experience statement, it is the intent of the resource education efforts to enable the general public to experience the following:

By visiting Great Smoky Mountains National Park, visitors will realize that GRSM is part of the US National Park System and understand the reasons why this System was established. Visitors will become aware of the rules and regulations that govern the Park and have a safe and enjoyable visit by learning about the educational and recreational opportunities that exist there. Through resource education programs, Park visitors will gain knowledge of the resource issues facing the Park and gain an understanding of the Park's significance and resource education themes. Resource education programs and media will help Park visitors develop a sense of stewardship and protection for the Park's resources. This sense of stewardship will be translated into these visitors' everyday actions at home, including support for management actions affecting the Park.

While resource education and interpretation is one of many recreational user experiences within the District and Park-wide, it is perhaps one of the most important, and key to the overall objectives of the Park. Over time, the general understanding and expectations of what is broadly known as education has changed. This has impacted the nature and direction of programs offered through the years. A variety of programs have been offered at Elkmont and many of the earliest resource education efforts focused heavily on the natural elements of the Park. However, the Park has strived to balance the coverage of offerings between natural and cultural resources of the area.

3.0 AFFECTED ENVIRONMENT

By the 1980s, as one of the visitor concentration points in the Park, the Elkmont Historic District offered an extensive spectrum of interpretive program events. Some of the “walks and talks” still offered bear names and follow routes developed 20 or more years ago. New programs have also been put into the traditional mix of ranger-led programs, including the “Nature’s Palette” artist walk and “Remember This Special Place,” an exploratory talk on individual meanings and feelings about the Smokies. Numerous diversified “walks and talks” and campfire programs are directed at teaching the public how to read the landscape, as well as interpretation of natural and cultural history. Interpretive program contacts at Elkmont, based on a five-month period in 1998, are shown in Table 3-18.

Table 3-18: Interpretive Program Contacts at Elkmont (June to October 1998)

Ranger Interpretive Contact/Program	Number of People Per Month ^{a/}					Total for 5-Month Period
	June	July	Aug	Sept ^{b/}	Oct ^{c/}	
Elkmont Campground	932	1596	609	58	186	3381
Elkmont VIP talks	6	--	--	3	--	9
Elkmont weekly talks	87	418	367	83	326	1281
Elkmont stream	12	17	8	--	6	43
Elkmont town	71	399	61	--	26	557
Jakes Creek	--	--	9	--	--	9
Upper Little River	--	6	13	--	10	29
Elkmont Slick Limb	--	8	10	--	22	40
Elkmont Mids Branch	6	--	8	--	--	14
Elkmont Bearwallow	11	14	18	15	16	74
Junior Ranger program Elkmont	23	28	6	--	--	57
Monthly totals	1,148	2,486	1,109	159	592	5,494

a/ Taken from raw data from Ranger roving contact reports, accuracy and completeness is dependent upon reports recovered for this period.

b/ Data for September 1998 is incomplete.

c/ Data for October 1998 is incomplete.

While this may not represent a complete picture of the array of interpretive programs and ranger contacts through such programs, it offers a fairly detailed account of the range of “walks and talks” given during this time frame, as well as contacts made with Park visitors during roving reports. In addition to the typical “walks and talks,” an extensive publications program, and campfire programs, the Park has also undertaken other educational avenues, including “Parks as Classrooms.” This was a pilot program for a 5-year period (1991 to 1996) that sought to integrate the Park’s natural and cultural values with interdisciplinary learning experiences, while meeting the state’s curriculum requirements.

The “Parks as Classrooms” program underwent a comprehensive evaluation in late 1996 and is still in place to teach youth about the significance and interconnectedness of all things. The most recent programs and interpretive media offered by the Park include the following:

Evening Program Topics:

- Bears of the Smokies
- Waterfalls of the Smokies
- Hiking in the Smokies

- History of a Mountain People
- The Civilian Conservation Corps
- Wildlife in the Smokies
- Off the Beaten Path
- Return of the Elk
- Move for a National Park
- Places and People of the Great Smokies
- Biodiversity in the Smokies
- History of Elkmont
- Great Smokies Overview
- The Double Life of Amphibians
- Guided Hike Topics
- Reading the Landscape
- Old Elkmont Town Walk

Interpretive Media:

- Sales Items:
 - *Last Train to Elkmont* (Weals)
 - *Whistle over the Mountain* (Schmidt and Hooks)
 - *Logging in the Smokies* (Pierce)
 - *Call Me Hillbilly* (Russel)
 - *Woman of the Mountains* (Bush)
 - *The Wild East* (Brown)
 - *Great Smoky Mountains: From Natural Habitat to Park* (Pierce)
 - *Strangers in High Places* (Frome)
 - Little River Lumber Company and Railroad Calendar
 - Logging history postcard strip
 - Elkmont self guiding nature trail folder
- Exhibits:
 - Elkmont self-guiding nature trailhead wayside
 - Signs at Wonderland Club and in Daisy Town

Ranger roves are routinely scheduled at Elkmont and through the campground to assist park visitors, answer questions, and discourage vandalism to structures during the summer months.

3.3.3 Visitor Use Data

The University of Idaho's Visitor Services Project conducted a visitor use study at the Park in 1996. The report does not seek to draw conclusions about specific sites or areas of the Park and resource use within them; however, several general conclusions can be drawn. The study indicates that 43 percent of summer visitors and 41 percent of all fall visitors to the Park accessed the Park through the Gatlinburg entrance (Littlejohn 1997). Based on the proximity of the Elkmont area to the Gatlinburg entrance and Sugarlands Visitor Center, it is likely that a substantial number of visitors to the Park, particularly those staying for less than a full day, use trails and/or trailheads that originate in the Elkmont Historic District.

3.0 AFFECTED ENVIRONMENT

Since Great Smoky Mountains National Park opened in 1934, visitor use has increased and the trend will likely continue.

- During the first 20 years of the Park's establishment, visitation rose from 154,000 to 1,945,100, with annual increases from 4 percent to 95 percent. Data indicate that only three years had a drop in total visits, and two of those were during World War II.
- During the 1950s and 1960s, visitation continued to increase, although not as dramatically. Annual increases during this period were between 1 percent and 31 percent, with most increases of less than 10 percent. Again, only three years showed a decline in visitation and those declines were 5 percent or less.
- From 1971 to 1991, annual visits rose from 7,173,000 to 8,654,459, with annual increases up to 12 percent. Eight of those years showed declining numbers of visitors of up to 14 percent, although most declines were less than 6 percent.
- The last 10 years of the 20th century showed similar visitation trends. Average annual increases were less than 10 percent and three years showed declines of between 1 percent and 7 percent.
- For the past 10 years, average annual visitation to Great Smoky Mountains National Park has been between 9 and 10 million, higher than at any other park in the country.

Visitation to Elkmont generally reflects the trend for increased visitation to the Park. During the first 20 years of the Park's existence, annual visits to Elkmont rose from approximately 21,000 to 105,424, a five-fold increase. During the 1950s and 1960s, visits to Elkmont continued to increase, although at a lower rate of approximately 150 percent over the two decades. From 1971 to 1991, the trend continued, but visitation only increased a total of 31 percent. From 1991 to 2001, visitation again increased, by a total of 12 percent.

Currently, about 350,000 to 400,000 people visit the District annually. In economic terms, the annual benefit from visitor recreation use is more than \$1 million. This is based on information gathered relating to the use in the District of the campground and hiking trails, and providing access to backcountry areas (NPS 2002a).

Seasonal trends for camping and backcountry use indicate the lowest rates during the colder months from November through February, during which time the Elkmont Campground is closed. The primary peak in use occurs in June, and two secondary peaks occur in March and October. Even though the campground is closed during the winter months, backcountry camping opportunities are still available, and overall trends for visitor use in Elkmont are comparable to those for camping and backcountry use.

3.4 SOCIOECONOMIC ENVIRONMENT

The potential labor force in Sevier County, defined as citizens over the age of 16, is 56,576. The majority (66.6 percent) are employed as civilians, while 0.1 percent serve in the Armed Forces. Approximately 33.4 percent of the working-age population is not in the labor force and the unemployment rate is 4.3 percent. The top three occupations in the county are management, professional, and related; service; and sales and office. Occupations that comprise less than 15 percent of the total include production, transportation and material moving; construction, extraction, and maintenance; and farming, fishing, and forestry.

The top industry category, approximately 22 percent of the total, includes arts, entertainment, recreation, accommodation, and food services. The next four largest industry groups are retail trade (15.8 percent); education, health, and social services (11.9 percent); manufacturing (11.4 percent); and construction (10.8 percent).

Most workers, 78 percent, earn private wages or salaries. Workers in local, state, or federal government make up 11.3 percent of the workforce, while 10.3 percent of the wage earners are self-employed. The median incomes for individual, full-time workers are \$20,646 for women and \$27,139 for men (U.S. Census Bureau 2000a).

The recreation, accommodation, and food service industries in Sevier County supply important service to Park visitors. Great Smoky Mountains National Park has the highest visitation of any national park in the country, and Sevier County is one of the most popular vacation locations for people traveling within the United States. The greatest proportion of visitors comes from within Tennessee and neighboring Georgia and North Carolina. Visitors to Sevier County stay an average of 3.9 nights, have an average of three people in a party, and often are returning for a repeat visit (74 percent).

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 also has had steady growth in cabin and condominium rentals (Lodging Resources, Inc. 2004).

One study concluded that 43 percent of summer visitors and 41 percent of fall visitors accessed the Park by way of the Gatlinburg entrance (NPS 2002a). Visitation to Gatlinburg mirrors the trend of visitation to the Park. Summer and fall are the seasons that receive the highest rates of visitation at 33 and 34 percent, respectively. Spring and winter are less popular seasons for people to travel to the area, with only 13 and 19 percent of annual visitation, respectively. Consequently, the demand for lodging during summer and fall is generally the highest. In nearby Pigeon Forge, from June to October, occupancy rates for lodging properties vary between 71 and 95 percent. From November to May, the rates are much lower, ranging from 30 percent in January to 58 percent in May and October. In 2004, average daily rates for lodging ranged from \$27 in January to \$65.50 in July (Lodging Resources, Inc. 2004).

3.4.1 Population and Environment

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. The majority of

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the population is white, with minorities comprising the following portions of the population: black or African American: 0.6 percent; American Indian and Alaska Native: 0.3 percent; Asian: 0.6 percent; Hawaiian and other Pacific Islander: less than 0.05 percent; and persons of Latino or Hispanic origin: 1.2 percent.

The average number of people per household is 2.48 with a median household income of \$34,719. In 1999, an estimated 10.7 percent of the population was living below the poverty level (U.S. Census Bureau 2000b).

The majority of the housing units in Sevier County have two or three bedrooms, with approximately 50 percent of the residents receiving their water supply through a public system or a private company and slightly less receiving their water from a private well. Sewage is most often (69 percent of households) stored in septic tanks or cesspools for disposal, with approximately 28 percent serviced by a public sewer system. The primary source of heating fuel in Sevier County is electricity (65 percent) with an additional 16 percent of the households utilizing wood and 10 percent using petroleum products such as fuel oil or kerosene as their principal heating source (U.S. Census Bureau 1990).

The two population centers closest to Elkmont are Gatlinburg and Pigeon Forge. These two towns are gateway communities to the Park. In 2000, Gatlinburg had a population of 3,382 with a median age of 46.8 (Area Connect 2000). Pigeon Forge had a population of 5,083 with a median age of 37.6. Each city had a small number of minority residents that comprised approximately five percent of the population (U.S. Census Bureau 2000c).

3.4.2 Land Use

The land surrounding the Park is primarily composed of forested mountains and hills. The small portion of neighboring land suitable for cultivation has been developed for agricultural use. Small towns and rural developments are sparsely spread across the region, but land use in some areas is rapidly changing as the population of the area continues to increase. A large part of the land in the area is publicly owned and includes two national parkways, three national forests, a Cherokee Indian reservation, and multiple water bodies developed by the Tennessee Valley Authority for flood control, recreation, and power generation (NPS 1982a).

Sevier County contains 592 square miles of land with a population density of approximately 120 people per square mile (U.S. Census Bureau 2000b). Approximately a third of the southern portion of the county is national park land that is primarily forested and undeveloped.

Within the Park, the *General Management Plan* designated management zones and subzones where specific strategies are employed to achieve specified goals. Guidelines outline which activities are appropriate for each zone and subzone. Most of the area in the Park (91.2 percent) is designated Natural Environment with the majority in subzone Natural Environment - Type 1. Management in these areas emphasizes allowing natural processes to dominate the landscape. Active management is used only to aid in restoring the environment to a condition that would have existed had there not been human disturbance and invasion by nonnative plants and wildlife. Acceptable forms of development include trails, designated campsites, signs, trail bridges, pit toilets, and hitching rails. Visitor use is allowed in these areas as long as the activities do not result in appreciable degradation

of the resource. Compatible recreation includes hiking, fishing, horseback riding, swimming, and backcountry camping (NPS 1982b).

The second largest area in the Park is designated Development, with three subzones: transportation (5.9 percent), general Park development (0.6 percent), and Park utilities (0.1 percent). (The remaining management zones total 2.2 percent of the Park.) This zone includes areas that enable visitors to experience the natural and cultural resource values for which the Park was created. Incorporated in this zone are roads that provide access, parking areas, interpretive displays, and areas designated for camping and picnicking. Other acceptable forms of development in these areas are buildings, utility systems, and storage areas needed for efficient operation and maintenance of the Park. The Elkmont Historic District falls under the transportation and general Park development subzones, which have a total area of approximately 34,000 acres in the Park. The transportation subzone consists primarily of public road corridors. The general Park 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 1982b).

3.4.3 Access and Circulation

Elkmont is relatively close to large population centers, only a one- to two-day drive for people living in most of the eastern United States. Approximately 78 percent of Park visitors travel from areas east of the Mississippi River, with 40 percent originating in east northcentral states (Wisconsin, Illinois, Indiana, Michigan, and Ohio), 24 percent from the south Atlantic states (from Maryland and West Virginia to Florida) and 14 percent from east southcentral states (Kentucky, Tennessee, Mississippi, and Alabama) (NPS 1982a). Travelers can reach the Park from the north using Interstates 75 or 81, from the east via the Blue Ridge Parkway or Interstate 40, from the west via Interstate 40 and from the south via U.S. Highway 441 or Interstate 75. The Blue Ridge Parkway is a national parkway and primary scenic drive for the region, allowing drivers to reach the Park from Shenandoah National Park in Virginia. Public transportation in the area is provided by bus lines and commercial airlines that serve the two closest large cities, Knoxville and Asheville, Tennessee (NPS 1982a).

A broad network of foot and horse trails provides visitors with nonmotorized access to the area. One of those trails, the Appalachian Trail, is a 2,174-mile-long hiking trail that bisects the Park and has been designated a national scenic trail.

The District is approximately 3 miles from the Park's northern boundary, making it easily accessible from Gatlinburg, one of the Park's gateway communities. Elkmont is also a short distance from Newfound Gap Road, which bisects the Park. This road leads from the Oconaluftee Visitor Center on the North Carolina side of the Park to the Sugarlands Visitor Center on the Tennessee side, near the Gatlinburg entrance. Data indicate that this road receives the heaviest traffic volumes of any road in the Park. The road that connects Pigeon Forge to Gatlinburg just outside of the Park boundary has even greater traffic levels (NPS 1982a). Even visitors with limited time to spend in the area are able take advantage of the recreational opportunities at Elkmont because of its proximity to Sugarlands Visitor Center and the gateway communities of Gatlinburg, Pigeon Forge, and Townsend.

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3.4.3.1 *Roads in the Elkmont Area*

The existing roads that provide access to the District extend along Little River Road, from just south of the Sugarlands Visitor Information Center, Newfound Gap Road to the east, and Little River Road to the west. Five road segments and one intersection provide primary access to the District and include:

- Newfound Gap Road from the Sugarlands Visitor Information Center to the intersection with Little River Road (1.8 miles)
- Little River Road from Newfound Gap Road to the intersection with Elkmont Road (4.8 miles)
- Little River Road from Elkmont Road to the intersection with Little Greenbrier Road (4.7 miles)
- Little Greenbrier Road from Little River Road to the intersection with U.S. Highway 321 (2.8 miles)
- Little River Road from Little Greenbrier Road to the intersection with Tennessee Highway 73 (7.6 miles)
- Intersection of Little River Road and Elkmont Road (unsignalized)

Newfound Gap Road is a two-lane, paved road with one travel lane each in the north and south directions. This road passes through the Park and connects Gatlinburg, Tennessee to Cherokee, North Carolina. The posted speed limit and general travel speed is 25 miles per hour in the vicinity of the District.

Little River Road is a two-lane, paved road with one travel lane each in the east and west directions.

Little Greenbrier Road is predominately a two-lane, paved road with one travel lane each in the north and south directions. The road narrows to a single lane at a bridge crossing the Little River, approximately 500 feet from the intersection with Little River Road. Little Greenbrier Road and Tennessee Highway 73 provide connections between U.S. Highway 321 and Little River Road.

3.4.3.2 *Roads within the Elkmont Historic District*

The internal roads serving the Elkmont Historic District are summarized in Table 3-19 and described in more detail below. Road locations are depicted on the existing condition map in Chapter 2. (Figure 2-1)

All of the paved roads that are used to access the District by vehicle are in fair (minor cracking or potholes) to good (no potholes, shows signs of normal use) condition. However, narrow, one-way roads leading through the cabin areas are deteriorating and are in need of repair and resurfacing.

The main road leading into Elkmont is NPS Route 18 (Elkmont Road) that extends from Little River Road to the Elkmont Campground. Elkmont Road is a two-lane, paved road that is 1.47 miles long. The road has one 3,055-square-foot parking area. The road surface is in fair condition, with occasional minor cracking and some minor surface depressions. Roadway drainage is good. This road has a paved bridge in good condition that crosses the Laurel Branch just west of the northern portion of the District.

Table 3-19: Internal Roads Serving the Elkmont Historic District

Route No.	Route Name	Route Description	Condition	Paved Miles	Unpaved Miles	Total Miles
18	Elkmont Road	From Little River Road to campground	Fair	1.47	0	1.47
133	Little River Road	From Route 18 (Elkmont Road) to trailhead	Fair	0.85	0.79	1.64
134	Jakes Creek Road	From Route 133 (Little River Road) to gate	Fair	0.71	0	0.71
233	Elkmont Campground	From Route 18 (Elkmont Road) to end of campground loop	Good	6.92	0	6.92

NPS Route 133, Little River Road, starts at Elkmont Road and continues to the Little River Trail trailhead. This 1.64-mile-long, two-lane road is partly paved, and about -half (0.79 miles) is unpaved. The road surface is in fair condition with occasional minor cracking and some minor surface depressions. Roadway drainage is good. This road crosses the Little River and is gated along Millionaire's Row.

NPS Route 134, Jakes Creek Road, provides access to the southern end of the District and connects to Little River Road in two spots. Jakes Creek Road is paved and is approximately 0.71 miles long. The road surface is in fair condition with occasional, minor cracking and some minor surface depressions. Roadway drainage is good. This road crosses Jakes Creek at its southern end and includes two smaller crossings over Bearwallow Branch and Tulip Creek.

NPS Route 233, Elkmont Campground Road, starts at the intersection of Elkmont Road and Little River Road at the park guard station. This circulatory road provides access to all the campground facilities within the District on both the eastern and western banks of the Little River. The campground loop is paved and is approximately 6.92 miles long. The road surface is in good condition with minimal cracking and good drainage. This road has a concrete bridge that spans the Little River.

In addition to these functioning roads, a closed road branches off Elkmont Road near the Wonderland Hotel, continues to the northwest, and crosses the Little River with a wooden bridge (Bridge 76). This bridge is in poor condition and is currently closed to vehicular traffic.

Secondary roads provide access to destinations within the District. These secondary roads are discussed below.

Wonderland Hotel and Adjoining Cabins. The Wonderland Hotel area is accessed by the dirt/gravel Catron Branch Road that winds around the hill at a moderate grade and terminates at the rear of the hotel. This road continues on as a dirt road through the cabin area above the hotel, eventually emerging on the Old Road to Gatlinburg, a gravel road that turns off Elkmont Road just before it reaches the Wonderland Hotel. This road is currently gated on each end and is only accessed occasionally by NPS service vehicles. This road through the cabin area and beyond is now little more than a dirt trail. It is very narrow for one-lane traffic and has a soft base. Consequently, it is washed out and rutted in many locations. At the northern end of this road, Catron Branch crosses through a corrugated metal culvert pipe that is now partially obstructed. Water currently flows around the culvert pipe and has washed away the roadbed at the crossing.

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Appalachian Clubhouse and Adjoining Cabins. Jakes Creek Road, which passes through Daisy Town, is a narrow, one-lane, asphalt road with broken pavement and potholes. This road, which ends at the Appalachian Clubhouse, is bordered on both sides by stone walls that run through most of the cabin area. While the road is sufficiently wide for one-way vehicular traffic, its narrow width and the restriction created by the stone walls make the road unsuited for a combination of vehicles and pedestrians. However, with no exhibits in this area to generate pedestrian traffic and only limited vehicular traffic, this road has an acceptable capacity. Current traffic patterns require that all traffic in the Daisy Town and Society Hill areas, including the Jakes Creek trailhead, leave the area through the use of this one-way road.

Society Hill. Jakes Creek Road through Society Hill is a narrow, one-lane, asphalt road with broken pavement and potholes. This road lacks the stone walls that are found in Daisy Town and has sufficient width to allow two cars to pass in opposite directions, but is not wide enough to safely allow two continuous lanes of traffic. The adjacent front yards of the cabins are sufficiently wide to accommodate pedestrian traffic at a safe distance from passing cars. Drainage from this road is good.

Millionaire's Row. An existing, narrow road extends through Millionaire's Row, but vehicular access to it is currently not allowed. Access about a mile further up the road was previously provided, but the National Park Service gated the road to prevent vehicular access because of inadequate parking, restricted room for vehicles to turn around, and the broken and potholed pavement condition. The road is currently used by pedestrians for access to the Little River hiking trails and occasionally by NPS service vehicles.

3.4.3.3 Existing Traffic Patterns

Road capacities and needs are based on the quality and quantity of use. Estimating the traffic using the area is the first step in defining the type of transportation facilities required to service an area.

According to historical traffic data and current traffic counts, the District currently generates 986 trips during an average 24-hour period. The term "trip" refers to one vehicle passing through a specific point on a road in either direction. For example, if one vehicle carrying four people enters the District via Elkmont Road for a picnic at noon and then leaves by the same route at 3:00 p.m. on the same day, that would constitute two trips (one entering trip and one exiting trip). Attractions in the District that result in trip generation include hiking, camping, and day uses.

In a traffic study performed for the District in 2004 (McGill Associates 2004), trip distributions were developed based on existing traffic patterns, surrounding population centers, and engineering judgment. It was estimated that the largest portion of trips (60 percent) access the District from the north on Newfound Gap Road from Gatlinburg, Pigeon Forge, Knoxville, and Interstate 40. Approximately 30 percent of the trips access the District from the northwest via Tennessee Highway 73 from Townsend and from Maryville, which is farther west. Five percent of the traffic accesses the site from the north via Little Greenbrier Road from U.S. Highway 321. The remaining 5 percent accesses the site from the south via U.S. Highway 441 from Cherokee, North Carolina.

3.4.3.5 Traffic and Circulation Study

By observing the monthly variations in traffic recorded on Newfound Gap Road, it was determined that two peak traffic periods of interest occur during the year. These include weekdays during the month of July and Saturdays during October. The peak weekday in July represents an average peak period for the purposes of analysis and this traffic condition is expected to occur several times throughout the year. The peak Saturday traffic condition in October occurs only a limited number of times throughout the year on especially "high visitation" days to the Park.

Existing weekday peak-hour traffic volumes for the roads and intersections within the District were analyzed using the method outlined in the *Highway Capacity Manual* (Transportation Research Board 2000). *Highway Capacity Software 2000* was utilized to analyze the road segments and unsignalized intersections. The capacity analysis for an unsignalized intersection does not provide an overall level of service, but does provide a level of service for movements that must yield to conflicting traffic. The levels of service designations were used as evaluation criteria for this study.

The *Highway Capacity Manual* defines capacity as "the maximum hourly rate at which persons or vehicles can reasonably be expected to traverse a point or uniform section of a lane or road during a given time period under prevailing road, traffic, and control conditions." Level of service is a term used to represent different driving conditions, and is defined as a "qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers." Levels of service vary from level "A," representing free flow, to level "F," where greater vehicle delays are evident.

For the purposes of this study, two types of capacity analyses were performed. The first type involved specific sections of road and is referred to as a two-way highway analysis. Two-way highway analysis measures levels of service in terms of percent time spent following a vehicle and the average travel speed a vehicle can expect to experience on a defined section of road. The level of service determined by a two-way analysis varies by the classification of the road in question.

There are two classifications of roads.

- A Class I road most often serves long-distance trips or provides connecting links between facilities that serve long-distance links. Users of a Class I road have an expectation of traveling at a high rate of speed and, therefore, mobility is a high priority for these drivers.
- Class II roads are facilities that connect Class I facilities, primarily serve recreational traffic, or travel through rugged terrain. Motorists on a Class II facility do not necessarily expect to travel at a high rate of speed and mobility is not as critical. Class II facilities only consider percent time spent following a vehicle in determining the level of service.

Each of the road segments included in this study serves recreational traffic, is considered to be in mountainous terrain, and was analyzed as a Class II facility. Table 3-20 provides *Highway Capacity Manual* levels of service and related percent time spent following per vehicle for a two-way facility. For example, a percent time spent following of 80 percent on a Class II facility results in a level of service D for that segment.

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Table 3-20: Highway Capacity Manual Levels of Service Criteria for Two-Lane Highways (Class II)

Level of Service	Percent Time Spent Following
A	0-40
B	40-55
C	55-70
D	70-85
E	>85

The performance of an intersection is measured in terms of delay per vehicle and also is presented in terms of level of service. Table 3-21 provides *Highway Capacity Manual* levels of service and related delay per vehicle for both signalized and unsignalized intersections. Levels of service are stated in terms of delay. For example, a delay of 30 seconds for a movement at an unsignalized intersection results in a level of service D for that movement.

Table 3-21: Highway Capacity Manual Levels of Service and Delay at Intersections

Level of Service	Control Delay per Vehicle (seconds)	
	Unsignalized Intersection	Signalized Intersection
A	0-10	0-10
B	10-15	10-20
C	15-25	20-35
D	25-35	35-55
E	35-50	55-80
F	>50	>80

According to the Highway Capacity Manual, “Capacity and other traffic analyses focus on the peak hour of traffic volume, because it represents the most critical period for operations and has the highest capacity requirements.” The analysis of level of service is based on peak rates of flow within the peak hour.

In accordance with standards set in the *Highway Capacity Manual* (Transportation Research Board 2000), the procedures for the analyses performed for this study were adjusted based on the traffic flow rates that occur during the peak 15 minutes of the peak hour. The adjusted peak-hour flow rate used in determining the design-hour flow rate is found by dividing the peak-hour volume by a “peak-hour factor,” which has been developed for urban and rural roads. The *Highway Capacity Manual* recommends a factor of 0.88 to be used for the analysis of rural roads such as those found within and leading to the District. For example, if a peak-hour volume of 1,500 vehicles was observed and a factor of 0.88 was applied, a design hour flow rate of 1,705 vehicles per hour (1,500 vehicles / 0.88) is calculated for the peak 15-minute period of the peak hour. With application of this factor, a traffic volume of approximately 426 vehicles (1,705 vehicles per hour x 0.25 hour) would occur for the peak 15 minute period. This means that the road design must consider that approximately 28.4 percent of the total traffic volume is expected to pass through the District in a peak 15-minute period instead of the 25 percent (15 minutes of the hour) that would be expected if the traffic arrived uniformly.

3.4.3.6 2004 Peak Traffic Volumes

Two-way automatic counts were performed at several points within the District in April 2004. The results were converted to the two selected time periods of interest: the peak-hour traffic occurring on a weekday in July and on a Saturday in October. These conversions were made using the average daily traffic data provided by the National Park Service from the automatic traffic recording station on Newfound Gap Road.

The average number of daily trips was converted to the number of trips expected in both peak conditions using the adjustment factors discussed earlier. The adjustment factors were applied only to trips that were associated with land uses considered to be unconstrained. Constrained trips are associated with land uses with a limited amount of spaces to be used. For instance, the campground is a constrained land use because there are only 220 campsites available for use. Only a certain number of trips can be expected to access the site, no matter what the time of year. For this analysis, the campground was considered to be fully occupied and, based on guidance in the *Highway Capacity Manual* (Transportation Research Board 2000) for estimation of trips to campgrounds and other recreation sites, each lot was assumed to produce an average of three trips per day. The hiking trails and day-use trips were considered unconstrained, because there is essentially no limit to how many people could utilize these land uses during a given period of time. The total number of trips expected to access the District included 1,169 trips on a weekday in July and 1,340 trips on a Saturday in October. However, not all of these trips affect the surrounding road network.

Some trips are internal trips that originate within and end within Elkmont. For example, a vehicle that enters Elkmont, traverses thorough the District visiting the trails, and then exits Elkmont is considered an external trip. However, if that same trip originated in the campground, it would be considered an internal trip. The number of internal trips is divided into two categories: trip “generators” and trip “attractors.” Trip attractors are reflective of the visitation to the District, while trip generators define the amount of travel within the District. Trip generators are facilities associated with lodging accommodations, such as the campground, and, in several of the proposed alternatives, the Wonderland Hotel and Annex and the cabins. Trip attractors include features such as the trails, backcountry camping, day-use facilities, exhibits, and the Wonderland Hotel restaurant, as applicable for each alternative. Individual stops at attractors, no matter how numerous or repetitive, are considered part of the same trip (internal or external).

Currently, the Elkmont Historic District is expected to generate 915 external trips on a weekday in July and 1,010 external trips on a Saturday in October. Table 3-22 provides a breakdown of trips.

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Table 3-22: Existing Traffic Summary of Trip Attractors for the District

Land Use	Number of Trips		
	Average Day	Weekday-July	Saturday-October
Campground	660	660	660
Backcountry Camping	3	5	6
Elkmont Nature Trail	2	3	4
Jakes Creek Trail	31	50	65
Little River Trail	36	58	75
Day-Use	254	393	530
Total	986	1,169	1,340
(Minus Internal)	(163)	(254)	(330)
External	823	915	1,010

Source: McGill Associates 2004

3.4.3.7 Analysis of Existing Peak-Hour Traffic Conditions

Elkmont Road is the only access point for vehicular traffic into the Elkmont Historic District. The weekday peak-hour traffic condition on this road occurs between the hours of 1:00 p.m. and 3:00 p.m. The peak could occur during either the 1:00-2:00 or 2:00-3:00 period, since a recorded traffic volume of 77 vehicles was observed during both time periods. The peak-hour volume represents 10 percent of the total daily traffic traveling to/from Elkmont Road on a typical weekday.

For the Saturday peak-hour traffic condition, the hour of study was determined to be between 2:00 p.m. and 3:00 p.m., and the peak traffic is expected to be 12.5 percent of the total daily traffic. The peak hour traffic conditions analyzed as part of this study were determined by using 10 percent of expected daily weekday traffic in July and 12.5 percent of daily Saturday traffic expected in October as the peak-hour volumes.

To determine the current level of service for the road segments and intersection within the District, the 2004 traffic volumes were analyzed under existing lane configurations and traffic control conditions. The results of the two-way road analysis are presented in Table 3-23 and the results of the intersection analysis are presented in Table 3-24.

The capacity analysis indicated that the road segment of Newfound Gap Road from the Sugarlands Visitor Information Center to Little River Road currently operates at an undesirable level of service D during the weekday and at a level of service E during Saturday peak-hour traffic conditions. These poor levels of service are primarily the result of high traffic volumes caused by seasonal traffic visiting the area. The capacity analysis also indicated that the road segments on Little River Road and Little Greenbrier Road operate at an acceptable level of service C or better during the weekday peak hour and a level of service D or better during the Saturday peak-hour traffic condition.

Capacity analysis of the unsignalized intersection indicated that the westbound left-turn movement from Little River Road onto Elkmont Road experiences minor delays (of less than 10 seconds per vehicle) and operates at level of service A during both weekday and Saturday peak hours. In addition, the minor approach of Elkmont Road operates at level of service B during the weekday

peak hour and level of service C during the Saturday peak hour. These are acceptable levels of service.

Table 3-23: Analysis of Existing (2004) Traffic Conditions (Two-Way Road Analysis)

Road Segment	Weekday		Saturday	
	Level of Service	Percent Time Spent Following	Level of Service	Percent Time Spent Following
Newfound Gap Road: Sugarlands Center to Little River Road	D	83.1	E	92.2
Little River Road: Newfound Gap Road to Elkmont Road	C	66.7	D	75.3
Little River Road: Elkmont Road to Little Greenbrier Road	C	63.4	D	73.4
Little Greenbrier Road: Little River Road to U.S. Highway 321	A	38.7	B	44.8
Little River Road: Little Greenbrier Road to Tennessee Highway 73	C	61.7	D	71.4

a/ Level of service for left-turn movement on major approach.

b/ Level of service for minor approach.

Table 3-24: Analysis of Existing (2004) Traffic Conditions (Unsignalized Capacity Analysis)

Intersection	Approach	Lane Configurations	Peak Hour Level of Service	
			Weekday	Saturday
Little River Road	Westbound	1 left turn – through	A ^{a/}	A ^{a/}
	Eastbound	1 through – right turn		
Elkmont Road	Northbound	1 left turn, 1 right turn	B ^{b/}	C ^{b/}

a/ Level of service for left-turn movement on major approach.

b/ Level of service for minor approach.

3.4.3.8 Projected (2015) Traffic

Background traffic volumes are needed to estimate the growth of traffic and subsequent change in traffic conditions projected under each alternative. Background traffic is that component of traffic that would result from the growth of use in the area that is anticipated to occur regardless of which alternative is implemented. The future year of analysis was selected by looking at a period of time 10 years beyond the 2004 existing conditions analysis.

The year 2015 daily traffic volumes were estimated by applying an annual growth rate to year 2004 traffic volumes. Historical visitation data for the Park were discussed in Section 3.3.3 and were used to determine an annual growth rate for this area. These historical visitation data indicated an annual growth rate of approximately one percent over the most recent 12 years of data available.

Analysis of Background (2015) Traffic Conditions. The background, peak-hour traffic volumes for year 2015 were analyzed using the method outlined in the *Highway Capacity Manual* (Transportation Research Board 2000) as previously noted for the existing traffic conditions. The results of the two-way road analyses and unsignalized intersection analysis are presented in Tables 3-25 and 3-26.

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Table 3-25: Analysis of Background (2015) Traffic Conditions (Two-Way Road Analysis)

Road Segment	Weekday		Saturday	
	Level of Service	Percent Time Spent Following	Level of Service	Percent Time Spent Following
Newfound Gap Road: Sugarlands Center to Little River Road	E	87.7	F	N/A
Little River Road: Newfound Gap Road to Elkmont Road	D	71.5	D	77.6
Little River Road: Elkmont Road to Little Greenbrier Road	C	66.9	D	73.8
Little Greenbrier Road: Little River Road to U.S. Highway 321	B	41.1	B	46.5
Little River Road: Little Greenbrier Road to Tennessee Highway 73	C	64.8	D	74.0

a/ Level of service for left-turn movement on major approach.

b/ Level of service for minor approach.

Table 3-26: Analysis of Background (2015) Traffic Conditions (Unsignalized Capacity Analysis)

Intersection	Approach	Lane Configurations	Peak Hour Level of Service	
			Weekday	Saturday
Little River Road	Westbound	1 left turn – through	A	A
	Eastbound	1 through – right turn		
Elkmont Road	Northbound	1 left turn, 1 right turn	B	C

Capacity analysis indicates that the road segment of Newfound Gap Road from the Sugarlands Visitor Information Center to Little River Road would continue to operate at an undesirable level of service E during the weekday peak hour and that the operation would deteriorate to a failing level of service during the Saturday peak hour. These poor levels of service primarily would be the result of the high traffic volumes that would occur on this road segment because of seasonal traffic accessing the area. Capacity analysis also indicated that the road segments on Little River Road and Little Greenbrier Road would operate at a level of service D or better during both the weekday and Saturday peak-hour traffic conditions.

Capacity analysis of the unsignalized intersection indicates that the westbound left turn movement from Little River Road onto Elkmont Road and the minor approach of Elkmont Road both would continue to operate at acceptable levels of service during the weekday and Saturday peak hours through the period to 2015.

Parking Lots. During peak visitation, parking within the District is inadequate. The primary destinations within the District, excluding the campground, are the Little River Trail trailhead and Jakes Creek trailhead. Of these, only the Jakes Creek trailhead has any parking space dedicated for use, and that space is inadequate for the demand of the peak season.

Wonderland Hotel and Adjoining Cabins. There currently are no parking areas dedicated to serving the Wonderland Hotel area. Visitors who wish to walk up to the Wonderland Hotel area park off the road in the dirt/gravel road shoulder at the base of the hotel steps, where there is room for about six cars. Others may park in the few parking spaces of an asphalt parking area in front of

the visiting scientist apartments (Building 600) across from the Wonderland Hotel steps. This asphalt parking area is in generally good condition and receives relatively little use.

A larger gravel/dirt parking area behind the site of the Wonderland Hotel currently is not accessible to the public because the road to the hotel is gated. If it were open, this lot could provide parking for approximately 35 cars. It is in fair condition, but would quickly deteriorate with regular vehicular traffic. The current configuration of this lot is not considered compliant with the Architectural Barriers Act Accessibility Standards for people with impaired mobility because of the condition of its gravel surface.

Appalachian Clubhouse and Adjoining Cabins. Daisy Town currently has one gravel parking lot adjacent to the Appalachian Clubhouse that could accommodate 10 to 15 cars. Since this area is not currently a popular destination within the District, this lot is not typically filled to capacity. The existing gravel surface is in generally good condition, but would deteriorate quickly with increased vehicular traffic. The current configuration of this lot is not considered compliant with the Architectural Barriers Act Accessibility Standards because of the condition of its gravel surface.

Jakes Creek Trailhead. The Jakes Creek Trailhead parking lot is located along Jakes Creek Road just below the access point to the trail. This parking lot has a gravel/dirt surface and is little more than a wide spot in the road, capable of providing parking for approximately eight cars. On weekends during the peak season, as many as 30 cars are parked in this area to access Jakes Creek Trail (NPS 2002a). The parking pattern is uncontrolled.

Little River Trailhead. The Millionaire's Row area serves as the trailhead for the Little River Trail and its connecting trails. There are currently no designated parking lots in this area. Parking is uncontrolled in the gravel/dirt shoulders along the sides of the road wherever space permits. Roadside parking can safely accommodate approximately 12 cars. Estimated use of this area for parking is similar to that experienced at the Jakes Creek trailhead, plus visitors who use the trail to access the river for fishing park in this area (NPS 2002a). This results in peak parking of approximately 35 cars per day.

A 3,055-square-foot parking area is located along Elkmont Road within the District. This lot provides parking for visitors hiking on the Elkmont Nature Trail. A 1,936-square-foot parking area is located outside the District along Little River Road beside the Little River and provides trail access.

3.5 OTHER RESOURCES

3.5.1 Viewshed

The aesthetic value of an area can be assessed by examining the visual character and quality of an area, while also considering the viewer response to that area or view. The visual character of a place is the product of both the natural features and those created by human development, such as roads, buildings, and bridges. Visual quality is assessed by examining the vividness, intactness, and unity of the view, defined as follows (Stanislaus Council of Governments 2001):

- Vividness is the visual power or memorability of landscape components (how distinctly landscape components are remembered) as they combine in striking or distinctive visual patterns.
- Intactness is the visual integrity of the natural and human-built landscape and its freedom from encroaching elements; this factor can be present in well-kept urban and rural landscapes, as well as in natural settings.
- Unity is the visual coherence and compositional harmony of the landscape considered as a whole.

A viewshed is defined as all of the surface area that can be viewed with an unobstructed sightline from a specific location or series of locations, such as a hilltop overlook, road way, or trail. In addition to examining the visual character and quality of an area, the perspective of the viewer must also be considered when evaluating a viewshed. The sensitivity and response of the viewer can be wide ranging. For instance, a person traveling to work would not be very sensitive to the details in the surrounding landscape, but visitors walking or driving through a national park would be traveling at a slower pace and have a much greater awareness of the views around them (high visual sensitivity) (Stanislaus Council of Governments 2001). The regional context should be considered as well, given that a human-built structure would be a much more noticeable visual element in an area dominated by natural features than it would in an urban setting.

The Elkmont Historic District is situated within the valley formed by the Little River and its associated tributaries. While most of the development in the District has occurred in low-lying, relatively open areas adjacent to the river and its tributaries, the site of the Wonderland Hotel and adjacent buildings is located on a ridgeline that is generally hidden from the main road. Because of relatively dense forestation, topography, and/or overgrown vegetation adjacent to buildings, the majority of the contributing structures have obstructed views of 100 feet or less. Many areas that were previously open pasture have succeeded to a variety of woody species. The vegetation is predominately native to the area and includes evergreen, deciduous, and herbaceous plants. Many nonnative plant species that were introduced during former human occupation also are present (see Section 3.2.2.4).

Most of the District's visitors are pedestrians or vehicle occupants traveling at a relatively low speed. Because these visitors have more opportunities to observe the viewsheds than they would in a faster moving vehicle, the intensity of the views (or the frequency of the selected viewpoints) will be high. Visual quality also changes naturally over time, as vegetation type and condition can be altered rapidly by fire, insects, weather, and human actions.

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3.5.1.1 Viewshed Mapping

The viewshed can consist of a plan view or a map of areas. Multiple techniques were used to assess viewsheds and visual sensitivity in the District.

ARCGIS Spatial Analyst (Version 9.0) computer software was used to illustrate views of and from the transportation and pedestrian corridors within the District. This software uses data points at approximately 10-foot increments along the corridors to define visual resources and the intensity of those resources. This software analyzes the digital terrain without the consideration of vegetation to simulate winter views. Summer views with leaves on deciduous trees can be represented by restricting the field of view evaluated by the software. In the District, the majority of the buildings have obstructed views of 100 feet or less. This method was used to evaluate the intensity of viewsheds experienced by a typical visitor to the District.

To assess the linear features of Elkmont, three composite viewshed maps were prepared and are included in Appendix E. The composite viewshed combines individual viewsheds along a road or trail and combines them to assess which areas are most visible from the corridor. Viewpoints were considered at approximate 10-foot intervals along the corridors. This interval spacing was derived by considering the user group, which consists primarily of pedestrians or vehicle occupants traveling at a relatively low speed.

The viewshed maps in Appendix D are separated into different areas to facilitate assessment. The smaller areas mapped were Elkmont Road (Figure D-1), Wonderland Club Area (Figure D-2), Daisy Town Area (Figure D-3), Campground Area (Figure D-4), Jakes Creek Area (Figure D-5), and Millionaire's Row Area (Figure D-6). Each small area's multi-point viewshed map used the vehicular or pedestrian corridors as the viewpoint. The visible land was broken into three shades of red. The dark red areas indicate the land that is seen from the most viewpoints while the light red is seen from the fewest number of viewpoints.

The small area viewshed maps were combined to create composite viewshed maps for the entire District (Figures D-7, D-8, and D-9). These composite viewsheds were mapped using three techniques to show the viewshed visibility.

- The first map was created in the same manner as the small area maps using three shades of red referring to the most and least visible areas (Figure D-7).
- The second map was created using five shades of red referring to the visible land (Figure D-8). This map was created to determine the most critical areas of the District.
- The third map used existing vegetation as a factor in the viewshed assessment (Figure D-9). Vegetation changes rapidly because of fire, insects, weather, and human actions and is typically not used as a control measure for visual assessment. Because most of the areas in the District have some degree of vegetation, this viewshed map uses a boundary of 100 feet on both sides of the viewshed corridors to represent the average foreground visibility of these corridors during spring and summer season when deciduous vegetation is in full leaf.

The findings of this study showed that most existing long-range views occur from and along the existing transportation corridors. However, because these corridors exist generally along low-lying areas of the valley, opportunities for panoramic views are limited by topography and vegetation. Therefore, most viewsheds are limited to individual areas of the District, such as the Wonderland area or the Millionaire's Row area.

3.5.1.2 Photo-Realistic Simulations

Representative photo-realistic simulations were prepared to show the existing condition and demonstrate the potential visual impacts of some components of the proposed alternatives. The simulations are based on digital photographs that were taken from several areas of the District and are provided in Appendix E. Most of the photographed areas represent historically or architecturally significant views, while others are areas where parking lots are proposed.

The simulations illustrate the visual effects of removing existing buildings and design techniques used to mitigate viewshed impacts through the use of vegetation buffers in proposed parking areas. This work is intended to demonstrate impacts on specific buildings to generally relate the magnitude of changes associated with other buildings within the District. Representative simulations were created at the following locations: Appalachian Club parking area, Daisy Town parking area, Vernon Moore Cabin (#58-1A), Beaman Cabin (#58-8H), Daisy Town Cabins, and Parrot Cabin (#44).

3.5.2 Soundscape

Sound currently generated within the Elkmont Historic District consists of natural sounds, such as those from rivers, creeks, and animals, and human-produced sounds, such as those produced by vehicles visiting the District, campground sounds such as noise made by power generators and human interaction, and sounds made by maintenance equipment.

Human-produced sounds could derive from a variety of sources, such as exhaust fans on heating, ventilation, and air conditioning systems; electrical motors on vents; gas-powered motors on machines such as landscaping equipment; and construction noises. One of the primary human-produced sources of sound includes vehicles entering the site.

Noise is defined as unwanted sounds. It is emitted from many sources, including airplanes, factories, railroads, power generation plants, and highway vehicles. Traffic noise is usually a composite of noises from engine exhaust, drive train, and tire-road interaction. The magnitude of noise is usually described by its sound pressure. Because the range of sound pressure varies greatly, a logarithmic scale is used to relate sound pressures to some common reference level, usually described in decibels (dB). Sound pressures described in decibels are called sound pressure levels and are often defined in terms of frequency-weighted scales. The most commonly used in vehicular noise measurements is the A-weighted scale because it places the most emphasis on the frequency range to which the human ear is most sensitive (1,000 to 6,000 Hertz). Throughout this report, all noise levels will be expressed in A-weighted decibels. Several examples of noise pressure levels in A-weighted decibels are provided in Table 3-27.

Most individuals are exposed to fairly high noise levels from many sources as they go about their daily activities. The degree of disturbance or annoyance they experience from unwanted sound depends on:

- the amount and nature of the intruding noise
- the relationship between the background noise and the intruding noise
- the type of activity occurring where the intruding noise is heard

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Table 3-27: Noise Levels for Common Sounds

A-Weighted Decibels	Common Sounds	Noise Impact
140	Shotgun blast Jet 100 feet away at takeoff Motor test chamber	Pain Human ear pain threshold
130	Firecrackers Severe thunder	
120	Pneumatic jackhammer Hockey crowd Amplified rock music Textile loom	Uncomfortably loud
110	Subway / elevated train, heavy city traffic Farm tractor, power lawn mower Newspaper press, noisy factory Diesel truck at 40 miles per hour 50 feet away	Loud
90	Crowded restaurant, garbage disposal	
80	Average factory, vacuum cleaner Passenger car at 50 miles per hour 50 feet away Quiet typewriter	Moderately loud
70	Singing birds, window air-conditioner	
60	Quiet automobile Normal conversation, average offices	Quiet
50	Household refrigerator Quiet office Average home	Very quiet
40	Dripping faucet	
30	Whisper 5 feet away	Average person's threshold for hearing
20	Light rainfall, rustle of leaves Whisper	Just audible
10		
0		Threshold for acute hearing

Source: Olishifski and Harford 1975.

Regarding the first factor, individuals have different hearing sensitivities to noise. Loud noises bother some more than others and some individuals become agitated if an unwanted noise persists. The time patterns of noise also enter into an individual's judgment of whether a noise is offensive. For example, noises occurring during sleeping hours are usually considered much more disruptive than the same noises in the daytime.

With regard to the second factor, individuals tend to judge unwanted noise in terms of its relationship to noise from other sources (background noise). The blowing of a car horn at night when the background noise levels are low would generally be more objectionable than the blowing of a car horn in the afternoon when background noise might be high.

The third factor is related to the interference of noise with activities of individuals. In a 60 A-weighted decibel environment, normal conversation would be possible, while sleep might be difficult. Activities requiring high levels of concentration may be interrupted by loud noise, while activities requiring manual effort may not be affected to the same degree.

3.5.2.1 Abatement Criteria

The Federal Highway Administration noise abatement criteria set forth in 23 *Code of Federal Regulations*, Part 772 were considered when evaluating existing and future noise levels. A summary of the noise abatement criteria for various land uses is presented in Table 3-28. This study focused on Category B criteria, because this activity category most closely resembles the types of activities that occur in the District.

3.5.2.2 NPS Policies Regarding Noise Management

Several statements in *Management Policies 2006* (NPS 2006) describe the approaches to be taken for managing noise in national park units.

- The National Park Service will preserve, to the greatest extent possible, the natural soundscapes of parks (Section 4.9).
- The Service will restore to the natural condition wherever possible those park soundscapes that have become degraded by unnatural sounds (noise) (Section 4.9).
- For the purposes of these policies, unacceptable impacts are impacts that, individually or cumulatively, would ... unreasonably interfere with ... the natural soundscape maintained in natural ... locations within the park (Section 8.2).
- The Service will strive to preserve or restore the natural quiet and natural sounds associated with the physical and biological resources of parks (Section 8.2.3).
- The natural ambient sound level—that is, the environment of sound that exists in the absence of human-caused noise—is the baseline condition, and the standard against which ... conditions in a soundscape will be measured and evaluated (Section 8.2.3).

To be consistent with the noise abatement criteria, the equivalent sound level (Leq) was used for this study. The Leq is a level of constant sound that, in a given situation and time period, has the same energy as sound levels that vary over time. In other words, the fluctuating sound levels are represented in terms of steady noise level with the same energy content.

3.5.2.2 Sound Levels in Great Smoky Mountains National Park

Ambient sound level measurements were conducted to quantify the existing noise levels in the District for the purposes of comparing this base information to future noise levels.

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Table 3-28: Noise Abatement Criteria (Hourly Sound Level in A-Weighted decibels)

Activity Category	Leq (h)	Description of Activity Category
A	57 (Exterior)	Lands on which serenity and quiet are of extreme significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	Picnic areas, recreation areas, playground, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties, or activities not included in Categories A or B.
D	---	Undeveloped lands.
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: Title 23, *Code of Federal Regulations*, Part 772, U.S. Department of Transportation, Federal Highway Administration

Table 3-29 presents sound readings conducted on Friday, April 16 and Saturday, April 17, 2004 within the District between the hours of 6:00 p.m. and 8:30 p.m. Table 3-30 presents readings conducted on Sunday, April 18, 2004 (when some schools were on Easter break) at the two Cades Cove visitor centers between 12:30 p.m. and 1:30 p.m. The time period of the readings conducted within the District were taken during a period of the day when activity was somewhat minimal, while the readings taken within Cades Cove were taken during a period of substantial activity. The differing time periods provide a conservative comparison between the two reading sites. Tables 3-29 and 3-30 illustrate the noise measurement locations and resulting levels.

Ambient noise levels measured within the District ranged from a low as 36.5 A-weighted decibels to as high as 60.4 A-weighted decibels. Sound levels measured away from rivers and creeks and from human sources were relatively low, one of which measured below 40 A-weighted decibels. Sound levels near rivers and vehicles were relatively high, including a reading that exceeded 60 A-weighted decibels near Jakes Creek Trailhead, because of the noise generated by Jakes Creek.

There was little distinction between sound levels recorded near rivers and creeks and near vehicles. Depending on the distance from the source, noise levels were about the same for a car or sport utility vehicle and a swiftly moving river or creek. A variety of readings were taken of similar vehicles at similar distances from the meter to verify the readings. In addition, sound readings were compared for similar responses to the same input source to ensure the accuracy of the meter.

The sound readings were taken at two locations in Cades Cove to determine human-produced noise levels for “exhibit-type” land uses. These readings represent sound levels that are generated by visitors arriving by vehicles and interacting within the Cades Cove environment.

Table 3-29: Ambient Sound Level Readings within Elkmont Historic District

Site No.	Date	Location	Sound Level Leq (A-weighted decibels)	Comments
1	4/17/04	End of road near cemetery	36.5	Sunny; light wind (~0-5 miles per hour (mph)); some birds
2	4/17/04	In front of hotel at old fountain	46.9	Sunny; light wind (~0-5 mph); some birds; river nearby could be heard
3	4/17/04	Parking lot behind hotel	43.3	Sunny; light wind (~0-5 mph); some birds; river nearby could be heard
4	4/17/04	Next to Elkmont Road at hotel steps	51.7	Sunny; light wind (~0-5 mph); some birds; river nearby could be heard; two cars passed meter during reading
5	4/17/04	Nature Trail parking lot near campground	49.4	Sunny; light wind (~0-5 mph); some birds (woodpecker nearby); river nearby could be heard; children in campground could be heard
6	4/17/04	Millionaire's Row	55.3	Evening; light wind (~0-5 mph); river nearby could be heard loudly
7	4/17/04	Parking lot at Millionaires Row	48.7	Evening; light wind (~0-5 mph); river nearby could be heard; one minivan started during reading
8	4/17/04	Jakes Creek Trailhead on road near creek	60.4	Very light wind (~0-5 mph); some birds; river nearby could be heard
9	4/17/04	Society Hill	50.8	Very light wind (~0-5 mph); river nearby could be heard
			50.1	
10	4/17/04	Daisy Town at beginning of one-way road	46.8 (no cars) 58.9 (diesel truck) 53.7 (Ford Expedition)	Very light wind (~0-5 mph); some birds; river nearby could be heard
11	4/17/04	In front of Appalachian Clubhouse	52.0	Very light wind (~0-5 mph); some birds; river nearby could be heard; jeep started during reading
12	4/17/04	Gate to Jakes Creek Cemetery	50.1	Very light wind (~0-5 mph)
13	4/17/04	Campground – Loop C near Little River Road	43.5 41.8 (no vehicles)	Evening; light wind (~0-5 mph); some birds; river and people talking nearby could be heard

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Table 3-30: Ambient Sound Level Readings at Cades Cove Visitor Center

Site No.	Date	Location	Sound Level Leq (A-weighted decibels)	Comments
1	4/18/04	Cades Cove Information Center in grass near parking lot adjacent to visitor information stand	54.9	Sunny, light wind (~5-10 miles per hour (mph)); people talking ~20 ft. away; vehicles starting in parking lots; vehicle doors opening/closing; children playing ~50 ft. away; vehicles passing visitor center on Cades Cove Road ~20 mph; 84 vehicles (cars, trucks, and vans) were counted during sound measurement (15 minute period) Sunny, light wind (~5-10 mph); children/people talking ~20 ft. away; vehicles starting/stopping in parking lots; vehicle doors opening/closing; vehicles traveling around parking lot loop ~5-10 mph; crows squawking Readings of Various Vehicles 39.5 A-weighted decibels – no vehicles or people 55.0 A-weighted decibels – vehicles on both sides of meter 62.7 A-weighted decibels – loud diesel truck entering lot (>100 feet from meter) 52.5 A-weighted decibels – normal car 48.3 A-weighted decibels – car starting 100 feet from meter 52.5 A-weighted decibels – car starting 50 feet from meter 49 to 65 A-weighted decibels – two motorcycles
2	4/18/04	Abram's Visitor Center in grass in center of gravel parking lots; about 100 vehicles in parking lot at start of reading with continuous vehicle "turn-over"	52.8	

Sound levels at Site No. 1 shown in Table 3-30 were recorded at the entrance to Cades Cove in a grassy area near the visitor center booth adjacent to the paved parking lot. A total of 84 vehicles were counted during the 15-minute recording period. The majority of these vehicles stopped at the visitor's center, with the remaining continuing on to the Cades Cove loop. Travel speed was estimated to be an average of approximately 15 to 20 miles per hour. People were interacting near the visitor booth. The sound meter was located approximately 30 feet from both the visitor booth and the parking lot. While several vehicles generated very high sound levels (in excess of 60 A-weighted decibels), the equivalent sound level for the period was 54.9 A-weighted decibels.

Sound readings at Site No. 2 shown in Table 3-30 were measured in a grassy area located between the parking lot loop road near the entrance to the Abram's Visitor Center. Several gravel parking areas are located in this vicinity. A total of 65 vehicles were counted during the recording period (29 vehicles entered and 36 exited). There were approximately 100 vehicles parked at the facility at the beginning of the study. Travel speed was estimated to be an average of approximately 5 to 10 miles per hour. The sound meter was placed in the center of the parking lot loop road, approximately 20 feet away from the road on each side. Although there were several different types

of vehicles, each generating various levels, there were periods with no human-produced sound. The resulting equivalent sound level for the period was 52.8 A-weighted decibels.

As shown in Table 3-30, several “instantaneous” readings of various vehicles were conducted. These readings were taken in an effort to show what can be expected from differing types of vehicles traveling through the District. With no vehicles or other human-produced sound, the ambient sound level was 39.5 A-weighted decibels. One reading reached 65 A-weighted decibels, an increase of more than 25 A-weighted decibels, when two motorcycles passed 20 feet from the meter. However, these readings represent the maximum sound level of the reading over a very short period of time (less than one minute) and not the steady sound level expressed given by the equivalent sound level over an extended period of time.

3.6 NPS OPERATIONS

Current NPS operations include maintenance of existing infrastructure. The existing conditions of components of the infrastructure at the Elkmont Historic District are described in the following paragraphs.

3.6.1 Wastewater Collection and Treatment

The National Park Service operates a wastewater collection and treatment system in the Elkmont Historic District. A wastewater collection system consisting of gravity sanitary sewers serves the campground, located in the center of the District. Campground wastewater treatment and disposal is provided by an activated-sludge wastewater treatment plant. There is also an inactive gravity sanitary sewer line serving the Daisy Town and Society Hill cabin areas, with treatment and disposal formerly provided by a septic disposal system. Gravity sewers connect the Wonderland Hotel and adjoining cabins to a separate, inactive septic disposal system.

Elkmont Campground Collection Systems. The Elkmont Historic District has a gravity sanitary sewer system that currently serves 12 restrooms in the campground areas. The system has two main branches with one branch located on either side of the Little River. The western branch extends from the wastewater treatment plant, south along the campground road, and ends at the southernmost campground restroom. The eastern branch serves campsites on the eastern side of the Little River and connects to the western branch via an understream crossing of the Little River just north of the Elkmont Campground Bridge.

Visual observations of the campground sanitary sewer system were made by opening and observing conditions at several manholes. The examination indicated that the sewer pipe is most likely composed of cast iron material in adequate (usable, but showing signs of wear and maintenance needs) condition. All manholes observed were constructed of prefabricated concrete and appeared to be in good (usable, showing little sign of wear and requiring little or no maintenance) condition. During the collection system inspection, some water was observed moving through the pipes beneath the manholes, even though the restrooms were closed for the winter. This indicates that the collection system may be experiencing inflow and infiltration, a condition where surface or ground water migrates into the system through leaks in pipes or manholes.

Elkmont Wastewater Treatment Plant. The District's wastewater treatment plant currently serves the Elkmont Campground areas. The plant, constructed in the mid to late 1960s, uses an extended aeration, activated sludge wastewater treatment process. It has a design treatment capacity of 35,000 gallons per day.

The wastewater treatment plant operates nine months of each year. In conformance with campground operation, the plant is closed during the winter months (December to February).

Based on historical operating records provided by the National Park Service, average daily flows processed through the plant have been approximately 12,000 gallons per day during the past three years. However, because of the seasonal nature of the campground that it serves, fluctuations in daily flows are common, with the maximum daily flows on many days exceeding 30,000 gallons per day.

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Wastewater enters the plant via a gravity sewer through a comminutor, a piece of mechanical equipment that grinds up larger material as it passes through a coarse screen. After screening, the wastewater flows by gravity into the extended aeration basin for treatment and then to final clarifiers where solids are settled out. Wastewater leaves the final clarifiers and flows through a Micro-Floc tube settler and mixed media tertiary filters. Disinfection of the treated wastewater is accomplished using sodium hypochlorite solution (liquid chlorine bleach). Dechlorination is achieved using sodium sulfide tablets. After dechlorination, treated wastewater is discharged into the Little River at river mile 49.7 via a gravity outfall sewer. The sludge is removed to a sludge holding tank by air-lift pumps and is hauled to the Gatlinburg wastewater treatment plant for final treatment and disposal.

The conventional extended aeration, activated sludge biological process with tertiary filtration that is used at the Elkmont wastewater treatment plant is a time-tested treatment process that typically performs very well under a variety of wastewater flow conditions. The extended aeration process has built-in buffering capacity that allows influent flows to be erratic during the course of a day. This enables the treatment plant to receive flows that vary both above and below the 35,000 gallon per day design flow for the plant. This treatment flexibility is needed to accommodate the variable diurnal flow characteristics that result from the campground and those that would result if new wastewater sources were generated in the future.

The hydraulic design capacity of the wastewater treatment plant, which is currently 35,000 gallons per day, is based on average day flows, with the capability to adequately treat much higher daily flows for short periods of time. Because the wastewater treatment plant must react to the flows that are received on a variable basis day-to-day, the hydraulic design capacity is not a permit limit parameter. This allows the plant flow to vary considerably while maintaining adequate biological treatment to meet the Little River discharge parameters.

Monthly operating reports for the Elkmont wastewater treatment plant for the years 1998 through 2003 indicate that the average flow through the plant was 9,976 gallons per day. The average flow for the years 1998 through 2000 was 7,660 gallons per day, and for the years 2001 through 2003, the flow was 12,291 gallons per day. The reason for these average day flow variations cannot be determined. All of the alternatives in Chapter 2 used the larger value for the most recent three years as the average base flow condition.

The monthly operating reports show several days where the plant flow exceeded 30,000 gallons per day. Many of these high-flow days result from operational issues, such as the recirculation of decanted backwash water and flush valve problems in the campground restrooms. When considering these issues, the peak day flows for wastewater are approximately 30,000 gallons per day.

The plant is in good condition and suited for continued use. The plant has consistently operated well within the discharge parameters described in its permit. However, the plant operator has commented that some repairs and/or upgrades may be necessary to the existing tertiary filters at the plant. These items may include regular maintenance issues, such as the replacement of the filter media, and/or some electrical or control upgrades to allow the operator to improve performance of the filter equipment.

Appalachian Clubhouse and Adjoining Cabins. A gravity sewer system connects the Appalachian Clubhouse and an undetermined number of cabins in the Daisy Town and Society Hill areas to an inactive septic disposal system located in the vicinity of the Appalachian Clubhouse. Because this collection and disposal system was installed and maintained by residents of the cabins, historical information concerning the location and condition of this system is unavailable. However, discussions with a former cabin resident and Park personnel indicate that the gravity sewer collection system was installed in the Daisy Town and Society Hill cabin areas in the early 1980s. This system was constructed in front of the Society Hill cabins.

Field observations of the sewer system indicate that it is in fair to good condition. The sewer system has line cleanouts located at cabin service connections. The specific condition of the sewer system cannot be determined without cleaning the sewer line and conducting a visual inspection with a sewer line camera. If the sewer line cannot be rehabilitated and reused, it would have to be replaced. It is not practical at this time to determine the location, capacity, and condition of the existing septic disposal system at the Appalachian Clubhouse; this determination would require extensive ground excavation. All of the alternatives in Chapter 2 assumed that the existing sewer system would require replacement.

An older sewer system was identified that formerly served the Society Hill cabins. This system was constructed under and to the rear of the cabins very close to Jakes Creek. Visual evidence of this system is evident because of its very shallow depth. Because of the deteriorated physical condition of this existing system and its inability to comply with current regulations, its reuse is not recommended.

The cabins located on Millionaire's Row have indoor plumbing and are served by a community sewer line installed between the cabins. This line has been visually observed in several locations near some of the cabins, but its condition is unknown. The final disposal of this wastewater is thought to be through use of a septic system, but this has not been confirmed. No visible signs of potential drain field locations were identified during the field investigation and delivery of this wastewater to other known septic system locations (specifically the Appalachian Clubhouse) via a conventional gravity system would not be practical.

Wonderland Hotel and Adjoining Cabins. Historical records indicate that the Wonderland Hotel and an undetermined number of adjoining cabins are connected to a septic disposal system by gravity sewers. Two septic disposal systems are located along Elkmont Road on the western and southern sides of the hotel. The condition and capacity of the septic systems is unknown and cannot be practically determined because of the extensive ground excavation that would be necessary. All of the alternatives in Chapter 2 assumed that complete replacement would be necessary.

3.6.2 Water Supply and Distribution

The National Park Service operates a water supply and distribution system in the Elkmont Historic District. The water system consists of a single well, three water storage tanks, and distribution pipelines that serve the campground areas.

There is an abandoned water supply system through the Daisy Town and Society Hill cabin areas. This water system consists of two water storage tanks (one wood and one steel) located above the

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Kuhlman cabin on the upper end of Society Hill, and a distribution system providing water to the Society Hill and Daisy Town cabins via a water line located adjacent to Jakes Creek and the older, abandoned sewer line.

Existing pipes indicate that the Wonderland Hotel and neighboring cabins, as well as the cabins in the Millionaire's Row area, were at one time connected to water distribution systems. However, the specifics of those systems would require excessive excavation to determine. Because of the age and deteriorated condition of the portion of the system examined, it is unlikely that any of it could be reused.

Elkmont Water Supply. Currently, the water supply for the Elkmont area is provided by a single well located up Jakes Creek Road, beyond the Society Hill cabins. This well supplies water to the Elkmont Campground, four apartments, and one residence house. A 5-horsepower pump delivers well water to three holding tanks located above Jakes Creek Cemetery. These include two 27,800-gallon fiberglass tanks and one 45,000-gallon concrete tank, for a total storage capacity of 100,600 gallons. The pump is capable of delivering 60 gallons per minute to the holding tanks. During peak season, approximately 22,240 gallons of water per day are delivered to the campground, apartments and house, requiring slightly more than six hours of pumping time.

Elkmont Campground Distribution System. Water is gravity-fed to the campground and residences from the storage tanks via an underground piping system. The system consists of a 6-inch diameter water pipe that crosses under the Little River and is buried 2 feet below the streambed. An inspection, conducted by the Tennessee Department of Environmental Conservation in 2001, found that the inside of the concrete water storage tank at Jakes Creek Cemetery was deteriorating. Consequently, the inside of the water tank was refinished in May 2002, and the fiberglass tanks were added. Other deficiencies noted in the inspection included a major leak of unknown origin and the need for a backflow prevention valve in the equine water trough near the well. Each of these deficiencies has been addressed. These are the only major improvements made to the system since 1993.

Appalachian Clubhouse and Adjoining Cabins. Cabins in the Society Hill, Daisy Town, and Millionaire's Row areas are on a separate water supply and distribution system from the campground system. This system, which has been abandoned since the cabins were vacated, consists of a small dam across Tulip Creek and a steel water storage tank at the upper end of the Society Hill area. A water distribution line runs beneath the Society Hill and Daisy Town cabins to the Appalachian Clubhouse. Because the cabins in the Millionaire's Row area also contained plumbing fixtures and no other visible source of water has been observed, this system may also have served the cabins in the Millionaire's Row area.

The actual locations of these water lines cannot be determined without additional historical information or substantial subsurface excavation. The current condition of this entire system is questionable, and further evaluation of the system would require substantial excavation of the pipelines for visual inspection. Based on the poor conditions of portions of the system that were visible, it was determined that reuse of the existing lines would not be feasible.

Wonderland Hotel and Adjoining Cabins. Physical evidence exists that the Wonderland Hotel and Annex, and the neighboring cabins were served with running water. This evidence includes the existence of small-diameter polyvinyl chloride (PVC) water supply lines under the hotel servant's

quarters building and at some cabins, and the existence of modern plumbing fixtures in some of the cabins. Determining the details of those services would require historical information or substantial subsurface excavation. The current condition of that entire system is questionable and it is unlikely to be suitable for continued use.

Environmental Consequences



4.0 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

The National Environmental Policy Act requires that a range of reasonable alternatives and the 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 implementing the No Action Alternative and a full range of action alternatives.

The No Action Alternative is consistent with the management direction provided in the *General Management Plan* (NPS 1982b) and builds on and incorporates the findings of National Environmental Policy Act documents associated with the *General Management Plan*. Actions required to implement each of the proposed alternatives are described in Chapter 2: “Alternatives.” The National Park Service may amend the management direction provided in the *General Management 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.

4.1.1 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 in accordance with National Environmental Policy Act guidance as to whether they are direct, indirect, or cumulative. The

4.0 ENVIRONMENTAL CONSEQUENCES

Council on Environmental Quality (1978) guidelines for implementing the National Environmental Policy Act, which are published in 40 *Code of Federal Regulations* Part 1508, define each type of effect according to the following definitions:

4.1.1.1 Direct Effect

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

4.1.1.2 Indirect Effect

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

4.1.1.3 Cumulative Effect

The cumulative effect is 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 usually is Great Smoky Mountains National Park, but in some cases, this area extends to the surrounding region.

The cumulative impact scenario that was considered included the following projects. Many have a transportation focus, because of their connection in allowing visitors access to the Park or their potential to affect resources within the Park.

U.S. Highway 441 / Newfound Gap Road Improvements. The Federal Highway Administration has planned to implement proposed improvements to a section of U.S. Highway 441 / Newfound Gap Road from the Park entrance south of the Oconaluftee Visitor Center near Cherokee, North Carolina, continuing into Park lands (NPS 2003b). The planning process is in progress, with construction expected to take place over the next three to four years. The project includes repaving all 17 miles of Newfound Gap Road (U.S. Highway 441) between the Park's boundary with Cherokee, North Carolina, and the Tennessee state line at Newfound Gap. Phase I of the project is limited to repaving and reconstruction within the existing road corridor along the 10.5-mile-long stretch of road from just north of the Collins Creek Picnic Area to Newfound Gap. However, the proposed work for Phase II may include more extensive construction outside the existing right-of-way to realign six intersections for improved safety along the 6.5 miles of the road from Collins Creek Picnic Area to the Park boundary at Cherokee (NPS 2004c).

U.S. Highway 19 / U.S. Highway 441 Bridge Project. Construction of a new, four-lane bridge across the Oconaluftee River in Cherokee, North Carolina, is planned to replace the existing three-lane structure along U.S. Highway 19 / U.S. Highway 441. The proposed work consists of constructing the new bridge next to the existing bridge, and then removing the old bridge (NPS 2003b).

U.S. Highway 19 Improvements. The Eastern Band of Cherokee Indians is in the process of implementing proposed enhancements to a segment of U.S. Highway 19 from Cherokee to Maggie Valley, North Carolina. The project is separated into seven phases, A through G. Some

phases have been funded and are in progress, while other phases are not yet scheduled for construction because of the lack of confirmed funding sources (NPS 2003b).

Cades Cove. An environmental impact statement process is proceeding to assess reasonable alternatives for addressing problems with traffic congestion at Cades Cove, a historic district that includes cultural resources representing the period from the 1800s to the early 1900s when European settlers developed the area as an agricultural community. Visitors often need two to three hours to complete the one-way loop road. During peak visitation, completing the loop may require four to six hours. Other concerns relate to the lack of adequate facilities for the number of visitors who currently travel to the area, protecting cultural resources from overuse, and continuing to provide a quality visitor experience (NPS 2004d).

Foothills Parkway Construction. The Foothills Parkway is a scenic roadway near the northern boundary of the Park. When finished, the road is planned to span 72 miles from Chilhowee, just west of the Park boundary, to the junction with Interstate 40, just north of the Park boundary, in the Cherokee National Forest. Several segments of the road have been completed, but others are being evaluated and have not yet secured funding. One section includes the proposed construction of eight bridges over the next 10 years (NPS 2003b).

North Shore Road. An environmental impact statement process has recently been completed that assessed alternatives to resolve a 1943 agreement that obligates the Department of the Interior to build a road to replace North Carolina Highway 288, a road which existed in an area that was flooded when the Fontana Dam was built. The agreement asserted that the new road would be built through the Park along the northern shore of Fontana Lake. In the 1960s, approximately 7 miles of the proposed 30-mile-long road were completed before construction was stopped because of funding and environmental concerns. A Draft EIS was released in January 2006. The DEIS did not include a Preferred Alternative, but stated that the Environmentally Preferred Alternative was to resolve the 1943 Agreement through payment of a monetary settlement in lieu of any further construction. On December 28, 2007 a Record of Decision (ROD) that officially calls for a monetary settlement to Swain County, North Carolina was signed. Six million dollars in the 2008 DOI budget which was signed on December 26, 2007 will be available as an initial payment to Swain County. Any additional funding called for in a new agreement would be subject to appropriation. In addition to supporting a monetary settlement, the selected alternative includes a commitment to maintain access and to continue transporting descendants to cemeteries on the North Shore of Fontana Lake. To support the long-term cost of maintaining the road access and providing this service the Park submitted a funding increase request during the FY 2009 NPS budget development process. (NPS 2008a).

Sevier County Actions. Other actions taking place in Sevier County include widening of U.S. Highway 321 in Gatlinburg; milling and paving operations along U.S. Highway 441 / Tennessee Highway 71 in Pigeon Forge, approximately 5 miles north of the Park; and road maintenance along West Foothills Parkway from Look Rock to U.S. Highway 129, approximately a mile west of the Park.

Elkmont Campground. The development, maintenance, and continued operation of the Elkmont Campground in the location of the former town of Elkmont represents a past and present action that is expected to continue into the foreseeable future at this site adjacent to the study area. This action affects and will continue to affect resources and visitors in the area.

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Natural Occurrences. In addition to human actions, there are natural occurrences that affect area resources. For example, a natural event that impacted the area involved heavy rains in 2003 that caused severe damage along Parsons Branch Road from Cades Cove to U.S. Highway 129.

4.1.2 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.

4.1.3 Intensity of Effects

Effects are 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 intensity level are provided in Table 4-1 for each impact topic.

4.1.4 Impacts to Cultural Resources and Conformance with Section 106 of the National Historic Preservation Act

In this environmental impact statement, impacts to cultural resources are described in terms of type, context, duration, and intensity, which is consistent with the regulations of the Council on Environmental Quality (1978) that implement the National Environmental Policy Act. These impact analyses are intended, however, to also comply with the requirements of Section 106 of the National Historic Preservation Act. The Advisory Council on Historic Preservation's regulations for implementing Section 106 of the National Historic Preservation Act, "Protection of Historic Properties," are published in 36 *Code of Federal Regulations*, Part 800. In accordance with these regulations, the impacts to cultural resources were also identified and evaluated by

- determining the area of potential effects
- identifying cultural resources present in the area of potential effects that are either listed in or eligible to be listed in the National Register of Historic Places
- applying the criteria of adverse effect to affected, National Register-eligible or -listed cultural resources
- considering ways to avoid, minimize, or mitigate adverse effects

Under the Advisory Council's regulations, a determination of either *adverse effect* or *no adverse effect* must also be made for affected National Register-listed or -eligible cultural resources. An *adverse effect* occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the National Register. This would include diminishing the integrity (or the extent to which a resource retains its historic appearance) of its location, design, setting, materials, workmanship, feeling, or association. Adverse effects also include reasonably foreseeable effects caused by the alternatives that would occur later in time, be

farther removed in distance, or be cumulative. A determination of *no adverse effect* means there may be an effect, but the effect would not diminish the characteristics of the cultural resource that qualify it for inclusion in the National Register of Historic Places.

The Council on Environmental Quality (1978) regulations and the National Park Service's guidelines for implementing the National Environmental Policy Act in *Director's Order #12 and Handbook: Conservation Planning, Environmental Impact Analysis, and Decision Making* (NPS 2001e) call for a discussion of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact, for example, from major to moderate or minor. Any resultant reduction in intensity of impact because of mitigation, however, is an estimate of the effectiveness of mitigation under the National Environmental Policy Act only. It does not suggest that the level of effect as defined by Section 106 of the National Historic Preservation Act is similarly reduced. Cultural resources are non-renewable resources and adverse effects generally consume, diminish, or destroy the original historic materials or form, resulting in a loss in the integrity of the resource that can never be recovered. Therefore, although actions determined to have an adverse effect under Section 106 may be mitigated, the effect remains adverse.

For cultural resources, the impact thresholds shown in Table 4-1 include determinations of potential effects under both the National Environmental Policy Act and the National Historic Preservation Act.

Table 4-1: Impact Threshold Definitions

Impact Topic	Impact Level	Threshold Definition
Cultural Resources		
Buildings	Negligible	Effects would be 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 – impacts would alter features of the buildings but would not diminish the overall integrity of the resources. The Section 106 determination of effect would be no adverse effect. Beneficial effect – stabilization/preservation of features would occur in accordance with <i>The Secretary of the Interior's Standards for the Treatment of Historic Properties</i> (The Secretary of the Interior 2005). The Section 106 determination of effect would be no adverse effect.
	Moderate	Adverse effect – impacts would alter features of the buildings, diminishing but not destroying the overall integrity of the resources. The Section 106 determination of effect would be adverse effect. Beneficial effect – rehabilitation of buildings in accordance with <i>The Secretary of the Interior's Standards for the Treatment of Historic Properties</i> (The Secretary of the Interior 2005). The Section 106 determination of effect would be no adverse effect.
	Major	Adverse effect – impacts would substantially alter buildings, greatly diminishing or even destroying the overall integrity of the resources. The Section 106 determination of effect would be adverse effect. Beneficial effect – restoration of buildings in accordance with <i>The Secretary of the Interior's Standards for the Treatment of Historic Properties</i> (The Secretary of the Interior 2005). The Section 106 determination of effect would be no adverse effect.
Cultural Landscape	Negligible	Effects would be 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 – impacts would alter patterns or features 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 would occur in accordance with <i>The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes</i> (The Secretary of the Interior 1995b). The Section 106 determination of effect would be no adverse effect.
	Moderate	Adverse effect – impacts would alter patterns or features 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 would occur in accordance with <i>The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes</i> (The Secretary of the Interior 1995b). The Section 106 determination of effect would be no adverse effect.
	Major	Adverse effect – impacts would substantially alter patterns or features 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 would occur in accordance with <i>The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes</i> (The Secretary of the Interior 1995b). The Section 106 determination of effect would be no adverse effect.

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Table 4-1: Impact Threshold Definitions

Impact Topic	Impact Level	Threshold Definition
Archeology	Negligible	Effect to sites would be 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 sites would result 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 sites in their natural state would occur. The Section 106 determination of effect would be no adverse effect.
	Moderate	Adverse effect – disturbance of sites 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 sites would occur. The Section 106 determination of effect would be no adverse effect.
	Major	Adverse effect – disturbance of sites 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 sites would occur. The Section 106 determination of effect would be no adverse effect.
Soils		
	Negligible	Effects would cause no measurable or perceptible changes in soil structure.
	Minor	Effects would be measurable or perceptible, but occur over a small area or areas in which soil disturbance has occurred in the past.
	Moderate	Effects would be localized and small in size, but cause a permanent change in the soil structure.
	Major	Effects to the soil structure would be substantial, highly apparent, and permanent.
Biotic Communities		
Terrestrial Plant Communities	Negligible	Effects would 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 would be measurable or perceptible, creating 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 would 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 would 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 would result in degradation or loss of a G1 – G3 ranked community and those that would occur

Table 4-1: Impact Threshold Definitions

Impact Topic	Impact Level	Threshold Definition
		outside natural variability.
Aquatic Communities	Negligible	Effects would cause no measurable or only slightly perceptible changes in aquatic community structure, function, and composition.
	Minor	Effects would be detectable, but slight. If adverse, the overall viability of the aquatic community would not be affected and, if left alone, would recover.
	Moderate	Effects would be apparent and would cause long-term changes in aquatic community structure, function, and composition.
	Major	Effects would be substantial, highly visible, and permanent.
Wetlands	Negligible	Effects would cause no measurable or perceptible changes in wetland size, integrity, continuity, or function.
	Minor	Effects would be 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 would cause no measurable or perceptible changes in floodplain size, integrity, continuity, or function.
	Minor	Effects would be 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 would be insignificant or completely beneficial. Beneficial impacts would be 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 would be 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 would not be discountable, insignificant, or beneficial.
Rare and Sensitive Species	Negligible	No impacts; no rare or sensitive species are present.
	Minor	Effects to rare or sensitive species would be detectable.
	Moderate	May impact individuals, but would not be 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 such as flowering or hibernation.
	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

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Table 4-1: Impact Threshold Definitions		
Impact Topic	Impact Level	Threshold Definition
		implementation is occurring during vulnerable life stages.
Water Quality	Negligible	Chemical, physical, or biological effects would not be detectable and water quality would remain well below limits of water quality standards and/or historical ambient or desired water quality conditions.
	Minor	Chemical, physical, or biological effects would be detectable, but water quality would well within or below limits of water quality standards and/or historical ambient or desired water quality conditions.
	Moderate	Chemical, physical, or biological effects would be detectable and water quality would remain within or below limits of water quality standards, but historical baseline or desired water quality conditions would be altered on a short-term basis.
	Major	Adverse chemical, physical or biological effects would be detectable, and would significantly and persistently alter historical baseline or desired water quality conditions. Beneficial impacts would eliminate sources of contamination or sedimentation of surface waters on a permanent basis.
Air Quality		
	Negligible	No measurable changes to current emissions would occur following project implementation.
	Minor	Emissions would decrease (beneficial) or increase (adverse) over the existing condition. If adverse, one or both nitrogen dioxide and volatile organic compound emissions would increase by 1 to 5 tons per year following project implementation in non-attainment areas.
	Moderate	Beneficial: Emissions of nitrogen dioxide or volatile organic compounds would 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 nitrogen dioxide and volatile organic compound emissions would 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 nitrogen dioxide or volatile organic compounds would occur. Adverse: Permanent increases greater than 5 tons per year in emissions of nitrogen dioxide or volatile organic compounds would occur as a result of project implementation; these increases either directly, indirectly, or cumulatively would interfere with the state's ability to meet National Ambient Air Quality Standards in non-attainment areas.
Interpretation and Visitor Use		
Visitor Experience and Visitor Facilities	Negligible	No effects or only temporary effects would be anticipated on the visitor experience. There would be 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 would not be measurable or perceptible.
	Minor	Desired visitor experience would be changed, but without appreciably limiting or enhancing critical characteristics of the experience. Visitor satisfaction would remain stable. Impacts on visitor safety may be realized through a minor increase or decrease in the potential for visitor conflicts in potential accident areas, such as traffic accidents or hazard tree effects.
	Moderate	Critical characteristics of the desired experience would be changed or the number of participants engaging in an activity would be changed. The potential impact on visitor safety would be sufficient to either remove existing potential hazards or to create the potential for additional visitor conflicts or accidents. If adverse, visitor satisfaction would decline.

Table 4-1: Impact Threshold Definitions

Impact Topic	Impact Level	Threshold Definition
	Major	Potential effects would either greatly enhance or detract from multiple critical characteristics of the desired visitor experience or greatly reduce or increase visitor safety or participation in visitor activities.
Socioeconomic Environment		
Land Use	Negligible	No effects would occur, or the effects on land use would be at or below the level of detection.
	Minor	Effects to existing land use would be detectable. User conflicts would not be anticipated.
	Moderate	Existing land uses would be 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 would be expected to arise because of conflicting use of resources or degradation of resources because of 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 because of conflicting use of resources or degradation of resources caused by intensity of use.
Access and Circulation	Negligible	No changes in access or internal circulation would result; visitation, if altered, would not affect internal circulation.
	Minor	Changes to internal circulation would be required to implement the alternative. These would include beneficial impacts, such as repair of existing roads and parking areas.
	Moderate	Changes to internal circulation and access restrictions would result from the alternative. Associated operation and maintenance costs would change.
	Major	Considerable changes to the internal circulation and access restrictions would result from the alternative. Associated operation and maintenance costs would increase.
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 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 and long-term, and would have substantial consequences to the visitor

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Table 4-1: Impact Threshold Definitions		
Impact Topic	Impact Level	Threshold Definition
		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 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 and 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 and 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 and long-term, and would result in a substantial change in Park operations in a manner noticeable to staff and the public.
	Major	The effects on NPS operations would be readily apparent and 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 changes in Park staff, funding, or other resources.

4.2 IMPACTS OF NO ACTION ALTERNATIVE

The No Action Alternative would entail the removal of all contributing and noncontributing 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 *General Management Plan* (NPS 1982b). 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 National Park Service would continue to implement its current natural resource management activities. The amount of visitation under the No Action Alternative would not change as a result of project implementation. There would be no changes to existing access or circulation or to the current level of general maintenance of existing infrastructure.

4.2.1 Impacts on Cultural Resources

4.2.1.1 Buildings and Cultural Landscape

The No Action Alternative would remove all 49 contributing buildings. These buildings provide a dominant definition to the cultural landscape and their removal would substantially alter the cultural landscape (mainly the “spatial organization” and “buildings and structures” characteristics, which are described and illustrated in 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 structures of the National Register of Historic Places-listed District and its cultural landscape, as would the change in use and setting (36 *Code of Federal Regulations* 800.5[a][1] and [2]). These effects would be long-term. 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. Direct, long-term, negligible beneficial effects would occur as a result of retaining some of the cultural landscape characteristics and features such as stone walls and chimneys; axial views from the roads and streams; and circulation features such as roads, paths, culverts.

4.2.1.2 Archeological Resources

The potential for the No Action Alternative to impact archeological resources depends on the level, extent, and location of ground-disturbing activities. Because this alternative would remove all of the contributing structures in the District, it would have the potential to impact archeological resources at several locations. The impacts to archeological resources from 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. Because eligibility for listing on the National Register

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of Historic Places has not been determined for most of the resources, and because no beneficial effects would be recognized, the project effects are uniformly categorized as potential adverse effects. If impacts occurred, they would be direct, adverse, long-term, and could be major. Table 4-2 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 B-5 of Appendix B. 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 C, Table C-1. The National Park Service would coordinate with the State Historic Preservation Office regarding appropriate response actions and mitigation measures. The exact types and costs of the mitigation cannot be calculated at this time.

4.2.1.3 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. The potential effects to archeological resources under the No Action Alternative also could result in a determination of adverse effect under Section 106 if proper avoidance or protective strategies for archeological resources that could be potentially impacted were not implemented.

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

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	

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

			Effect by Project Alternative							Additional Work Required and/or Potential Avoidance/Mitigation Strategy
Site	Locus	Assessment	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternatives D1 and D2	Alternatives E1 and E2	Alternatives F1 and F2	
	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. I – 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

4.2.2 Impacts on Natural Resources

Impacts to natural resources from the implementation of the No Action Alternative would result primarily from ground-disturbing activities. The No Action Alternative would remove all of the contributing structures 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 would 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 would remove all of the contributing structures in the District. During project implementation, soils would be disturbed if access by heavy machinery or other equipment was 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 the mitigation measures described in Section 2.10, such as only using low-ground-pressure equipment (except for hauling on existing roads) and removing 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 under the buildings cannot be estimated accurately without extensive sampling, they probably have a higher infiltration capacity than buildings, parking areas, and other highly impermeable surfaces. Exceptions to this increased infiltration capacity would include 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

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 offsite would require the use of heavy equipment. Protocols for project operations and impact avoidance measures have been developed by the National Park Service to minimize the potential for adverse effects to biotic communities (see

4.0 ENVIRONMENTAL CONSEQUENCES

Section 2.10). Even with incorporation of these measures, the work may result in unavoidable damage to tree limbs and crushing of herbaceous vegetation.

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		Net Gain or Loss
	(acres)	(hectares)	(acres)	(hectares)	(acres)	(hectares)	
No Action	2.41	0.98	22	9	0	0	+2.41
A	2.41	0.98	22	9	0	0	+2.41
B	2.04	0.83	22	9	1.3	0.5	+0.74
C	1.88	0.76	22	9	1.3	0.5	+0.58
D1	1.64	0.66	12	5	1.5	0.6	+0.14
D2	1.17	0.47	12	5	2.1	0.9	-0.93
E1	1.44	0.58	0	0	1.5	0.6	-0.06
E2	0.97	0.39	0	0	3.0	1.2	-2.03
F1	0.79	0.32	0	0	2.4	1.0	-1.61
F2	0.32	0.13	0	0	3.5	1.4	-3.18

The direct and indirect effects 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 because of variations in topography, slope, aspect, soil type, proximity to surface water, and the extent 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 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. These communities would expand and mature in these areas with the implementation of the No Action Alternative.

Every year, the National Park Service 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 contributing structures have not been removed, because 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 throughout floodplain and wetland areas (see Table 4-3) once the buildings were removed and hazard tree management was no longer necessary in these areas.

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 because of 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 National Park Service to minimize the potential for adverse effects to biotic communities (see Section 2.10). Even with incorporation of these measures, the work may result in unavoidable, yet negligible discharges of sediment into aquatic environments.

The indirect effect to aquatic resources in the District would be minor, long-term, and beneficial, resulting from an increase in the vegetation in plant communities near waterways, which would increase infiltration and decrease runoff and soil erosion. Once vegetation was 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 because none of these species are known to occur within the proposed project implementation area. However, this alternative would provide indirect, long-term, minor, beneficial effects to several state and federal species because of expanded and improved wildlife habitat in the District as a result of building removal and revegetation of disturbed areas.

A state-listed threatened species, butternut, and two state special concern species, Fraser's sedge and chamomile grapefern occur within the District. Implementation of the No Action Alternative would provide the potential for existing populations of these species to expand into revegetated areas. Similar benefits would 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 National Park Service 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.

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The hellbender 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 exists 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 would 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 National Park Service and members of 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. Because 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 roads in the District. Over the long term, without management to sustain those herbaceous habitats, woody vegetation would eventually encroach on 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

If heavy equipment was used in wetlands within Millionaire’s Row, short-term, direct, minor, adverse effects to wetlands would occur during project implementation as a result of disturbance created by these machines. The environment of the wetlands along Bearwallow Branch is not suitable for machine traffic or heavy pedestrian traffic because of saturated soil conditions. Although these wetlands may be disturbed during project implementation, this disturbance would be temporary and further minimized through seeding of native species over disturbed soils.

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; input 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 related 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.

The No Action Alternative would provide indirect, long-term, moderate 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 also be able to use nearby wetland habitat.

- 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.
- The water quality and, subsequently, the fish and shellfish habitat functions could potentially improve because of 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 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, indirect, negligible, adverse effects during project implementation and minor, indirect, long-term, beneficial effects following project completion. Because this alternative would remove all of the buildings across all areas of the District, former building sites would experience ground disturbance from heavy equipment and movement of vehicles off existing roads to access the buildings and transport materials out of the District. Although best management practices such as installation of silt fence would be followed, there could still be 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 were seeded and vegetation was established, approximately 2.41 acres of impervious surfaces would be eliminated, allowing for additional infiltration. Restoration of vegetation on exposed areas would create indirect, moderate, long-term, beneficial effects by filtering out nutrients and sediments in surface water runoff that currently enters the District's waterways.

Table 4-4 identifies the types and typical concentrations of constituents, such as nutrients, heavy metals, and petroleum that are found in typical road and parking area rainfall runoff. As shown in the table, such runoff typically exceeds the water supply maximum contaminant levels for lead, iron, manganese,

Total annual rainfall runoff volumes from impervious surfaces such as parking lots and roads have been estimated for all of the alternatives and are provided in Table 4-5. As the table indicates, road and parking lot surface water runoff would remain the same as the existing condition if the No Action Alternative were implemented. Therefore, No Action Alternative would have negligible impacts on road runoff and the water quality of receiving streams in the District.

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

Constituent	Primary Sources	Range of Average Concentration or Typical Loading (mg/L) ^{a/}	Water Supply Maximum Contaminant Level (mg/L)
Solids	Pavement wear, vehicles, atmospheric deposition, maintenance activities	437 – 508	none ^{b/}
Total Kjeldahl Nitrogen (TKN)	Atmospheric deposition, roadside fertilizer application	0.335 – 5.80	10.0
Phosphorus	Atmospheric deposition, roadside fertilizer application	0.113 – 0.202	none ^{b/}
Lead	Leaded gasoline from auto exhaust, tire wear (lead oxide filler material)	0.073 – 0.244	0.05
Zinc	Tire wear, motor oil, grease	0.056 – 0.143	5.0
Iron	Auto body rust, steel highway structures, moving engine parts	2.429 – 3.216	0.3
Copper	Metal plating, bearing and brushing wear, moving engine parts, brake lining wear, fungicides, and insecticides	0.022 – 0.723	1.0
Cadmium	Tire wear, insecticide application	0.001 – 0.005	0.01
Chromium	Metal plating, moving engine parts, brake lining wear	0.0001 – 0.004	0.05
Manganese	Moving engine parts	1.062	0.05
Sodium	Deicing salts	1.95 kilograms/hectare/year	none ^{b/}
Nickel	Diesel fuel and gasoline (exhaust), lubricating oil, metal plating, bushing wear, brake lining wear, asphalt paving	0.053	250
Petroleum	Spills, leaks of engine lubricants, antifreeze and hydraulic fluids, asphalt surface leachate	--	none ^{b/}

Source: McGill Associates 2004.

a/ Calculated based on year 2001 precipitation.

b/ mcf = million cubic feet.

Table 4-5: Effects of the Alternatives on Rainfall Runoff Volumes from Elkmont Historic District Roads and Parking Lots^{a/}

Alternative	Road Rainfall Runoff (mcf) ^{b/}	Parking Rainfall Runoff (mcf)	Total Rainfall Runoff (mcf)	Percent 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.

a/ Calculated based on year 2001 precipitation.

b/ mcf = million cubic feet.

4.2.2.6 Floodplains

There would be no direct, adverse effects to the 100-year floodplain of the Little River or its tributaries as a result of implementing the No Action Alternative. Long-term, direct and indirect, moderate, beneficial effects to these floodplains would be experienced through removal of buildings currently in and adjacent to the 100-year floodplains of Jakes Creek, Bearwallow Branch, and the Little River. An increase in the area available for infiltration and flood storage would be a direct benefit because of removal of five buildings in the 100-year floodplain. These buildings include Burdette (#16), Miller (#46), Faust (#47), Faust garage (#47A), and Young (#48) long-term, major, direct beneficial effect would be an increase in the area for recovery of associated floodplain plant communities, such as the Appalachian montane alluvial forest, that is expected to regenerate at former building sites. 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 air emissions because of the operation of equipment, the 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, using new diesel equipment or engines if available, using biodiesel with low nitrogen oxides additives, and performing removal during the time of year when ozone is least likely to form (October to March). The ozone season is March to October, with the worst problems typically in June, July, and August.

Table 4-6 provides a comparison of estimated post-construction emissions for each project alternative. The No Action Alternative would not result in any 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 nitrogen oxides and 72.64 tons per year of volatile organic compounds. These figures represent “worst case” scenario concentrations, and may be experienced on only a few days per year.

Table 4-6: Estimated Air Pollutant Emissions by Alternative, Year 2015

Alternative	Nitrogen Oxides			Volatile Organic Compounds		
	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	Not applicable	0.199	72.64	Not applicable
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

4.2.3 Impacts on Interpretation and Visitor Use

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Implementation of the No Action Alternative would not result in any effects on interpretation and visitor use. The number of visitors to the District would not 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 the 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. For visitors who see the contributing structures in the District as detracting from the aesthetic beauty of the natural environment, the No Action Alternative would provide direct and indirect, long-term, major, beneficial effects by removing the buildings from the landscape. For this same group, direct and indirect, negligible adverse effects would be experienced because of the retention of stone walls and chimneys after buildings were removed. Conversely, for visitors who see the contributing structures as an important visual and cultural asset, this alternative would have direct and indirect, long-term, major, adverse effects on their experience and direct and indirect, long-term, negligible beneficial effects as a result of the retention of stone walls and chimneys.

Currently, the buildings and associated grounds are closed to the public. However, the District provides multiple opportunities to view the extant cultural landscape, including the buildings and smaller-scale elements, from existing roads. 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, and examination of remaining features (stone walls, foundations, chimneys and other remnants of the contributing structures) 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.

Noise and other disruptions associated with construction activities in the District would introduce direct, short-term, negligible to minor, adverse impacts on visitor use and experience. These impacts would last only as long as the construction.

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 in the winter when the campground was closed and 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 moved through the area. The adverse effect of restricted access would be negligible to minor and short-term, occurring only during project implementation.

4.2.4 Impacts on Socioeconomic Environment

4.2.4.1 Land Use

Within the Development management zone at Elkmont, the *General Management Plan* (NPS 1982b) identifies two land use subzones: transportation and development. The transportation subzone consists primarily of public road 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.

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 *General Management Plan*. Implementation of the No Action Alternative would continue to allow for use of public road 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.

4.2.4.2 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 from October to March when campground use is low or the campground is closed. 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 were completed, visitation, as indicated by daily trip generation, would not change and the internal circulation would remain consistent with that of the existing condition (see Table 4-7 and Table 4-8). As a result, there would be no effects on access or circulation in the District.

4.2.5 Impacts on Other Resources

4.2.5.1 Viewshed

Impacts to visual quality would include changes that would alter or obstruct

- visible landscape features from viewpoints established as part of this analysis
- 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 roads and trails. Currently, the building grounds are closed to the public, and access to many of the viewpoints within the District is prohibited because of safety concerns related to the condition of the buildings.

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Table 4-7: Exterior Daily Trip Generation Summary

Trip Generator	Daily Trips by Alternative									
	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
Percent 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 4-8: 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

Because the *General Management Plan* (NPS 1982b) 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. If the *General Management Plan* approach (this alternative) were to be implemented, the existing buildings would be removed thereby restoring the natural viewshed of the study area. Long-term, direct and indirect, major, beneficial effects would be realized by removing the 74 buildings from the landscape. The views that would result from the removal of these features are shown in photos 3 through 6A in Appendix E. These images depict the existing views of a variety of contributing structures and simulations of the potential views following removal of the buildings. In addition to removing the buildings and restoring natural conditions,

the No Action Alternative would 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. These effects would be short-term and negligible.

The viewshed sensitivity maps shown in the visual quality assessment in Appendix E indicate the areas visible from a variety of viewpoints throughout the District. The direct effect on the composite viewshed would be long-term, major, and beneficial under the No Action Alternative because of removal of buildings and structures. Composite viewshed areas (Figures E-7, E-8 and E-9) would 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 would occur during implementation of the No Action Alternative. The major sources of noise during project implementation would be associated with the removal of buildings and hauling of materials. The noise emissions of combustion-powered equipment (usually diesel engines) would be the primary contributors to the sound level and could interfere with the ability of individuals near the work site and passersby to hear speech. Noise created during project implementation would be relatively short in duration and restricted to daytime hours and during the winter when visitation is the lowest.

For an area such as the 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. 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, measured at a distance of 50 feet, may vary from 70 to 100 A-weighted decibels.

Estimated average and maximum noise levels for all alternatives are provided in Table 4-9. It is expected that, following implementation of the No Action Alternative, equivalent sound levels of noise would be in the range of 35 to 60 A-weighted decibels and would never exceed the noise abatement criterion equivalent sound level of 67 A-weighted decibels. The quieter levels in this range would be achieved only at sites having natural conditions that are away from the influence of rivers or creeks with little wind. Because projected noise levels would remain the same as the existing condition, the No Action Alternative would have a negligible, long-term effect on noise levels in the District once construction activities were completed.

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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

4.2.6 Impacts on NPS Operations

The No Action Alternative would have direct, short-term, moderate to major, adverse effects on Park operations because of the requirements for funds and staffing to implement the removal of 74 buildings as directed in the approved *General Management Plan*. Following building removals, this alternative would have indirect, major, beneficial, long-term effects on NPS operations because there would no longer be a need for the funds and resources to monitor, stabilize, and maintain the buildings.

As described in Section 3.1.2, the buildings within the District are in various stages of disrepair, and most are in only fair or poor condition. The National Park Service makes repairs to stabilize the buildings on a regular basis. Despite these efforts, the buildings present hazards to visitors who enter this closed area, such as rotting steps, decks, and floors; collapsing ceilings, and materials falling from roofs, eaves, and leaning chimneys. Some of the buildings contain debris, including broken glass, fallen plasterboard, and lead-based paint. In addition, the buildings harbor animals that potentially can serve as vectors for diseases that are fatal to humans, including hanta virus, which is spread by rodents, and histoplasmosis, which is spread by bats and birds. Removing these 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 provide long-term, major benefits to NPS operations.

In moist cove forest communities, such as those found in the District, between 1.0 and 1.5 percent of canopy trees fail on an annual basis (Runkle 1982). To protect staff and the public, the National Park Service routinely removes hazard and fallen trees adjacent to roads, paths, exhibits, buildings, and other facilities. Within the Elkmont Historic District, many trees have fallen on the buildings, requiring removal of the tree and measures to repair damage to the buildings. Under the No Action Alternative, the National Park Service would continue to remove hazard trees at the current level, but would no longer have to repair buildings in the District that were damaged by the trees. This would create an indirect, long-term, major benefit for NPS operations through a reduction in costs associated with staff time and equipment needs.

General maintenance of grounds, roads, and trails, including litter pick-up, mowing, and vegetation management, would still be required in addition to some law enforcement. The No Action Alternative would have a negligible effect of this component of NPS operations.

4.2.7 Cumulative Effects

Implementation of the No Action Alternative would provide long-term, major, beneficial cumulative effects to biotic communities; potential habitat for threatened, endangered, rare, and sensitive species; wetlands; water quality; and floodplains. 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 the resulting 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 indicates the pristine nature and excellent water quality in the river. Although water quality in the Little River and its tributaries has remained high, contributions of sediments from erosion or petrochemicals from parking area runoff can add to the existing load already entering the river system from the large number of visitors to the Park and surrounding gateway communities. Reduction of runoff and elimination of erosion would help to lower the potential for contaminants to enter the river, further protecting it from degradation.

Revegetation of native plant communities would increase total vegetation cover. This would increase the area of available wildlife habitat. It also would help in the control of invasive, non-native plant species, which thrive in disturbance areas.

The long-term, major, adverse effect on cultural resources in the No Action Alternative would be major in a cumulative sense as well. According to the National Register of Historic Places nomination form, the Elkmont Historic District contains the only resort community maintaining integrity in east Tennessee (Thomason *et al.* 1993). While the Park contains a variety of historic buildings and cultural landscape components, the loss of the District buildings would represent the loss of the only identified resort community of its type and time period maintaining integrity in this part of the state. 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 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 increase the area available for reestablishment of the globally imperiled montane alluvial forest. 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 benefit from the No Action Alternative because of the removal of buildings that

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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.

Irretrievable commitments of resources would result if the No Action Alternative was implemented. These commitments would be created primarily by removing the contributing structures within the District. This loss of cultural resources would substantially alter the characteristics of the Elkmont Historic District and this major adverse effect would be long-term. There is also the potential for irreversible impacts to archeological resources as a result of implementation of this alternative, but those effects could be eliminated or minimized through proper planning and avoidance measures.

Unavoidable adverse impacts associated with implementing the No Action Alternative primarily would be 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 would remove all contributing structures 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 monitoring and management plan for invasive, non-native plant species. 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 would not change measurably and current recreational activities in the District would continue. The National Park Service 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

4.3.1.1 Buildings and Cultural Landscape

The contributing structures in the Elkmont Historic District would be removed under Alternative A. This action would constitute a direct, long-term, major, adverse effect on the structures of the National Register-listed District and its cultural landscape, as would the change in use and setting (36 *Code of Federal Regulations* 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 long-term, major, adverse effects, principally because of the removal of all of the contributing structures from the District and most of the small-scale features. There would be no indirect effects on the District’s cultural landscape.

Several components of this alternative would provide negligible, direct, long-term benefits to the cultural landscape. Some cultural landscape characteristics and features would be retained, including the axial views from the roads and streams; and circulation features such as roads, paths, culverts, and the footbridge over Bearwallow Branch. 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 would depend on the extent and location of ground-disturbing activities. Because Alternative A would remove all of the buildings in the District, it would have the same potential to impact archeological resources as the No Action Alternative, but the potential would be less than for

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those alternatives that require installation of new sewer lines, water lines, or parking lots. All 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 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.

The impacts to archeological resources because of 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.

4.3.1.3 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. The potential effects to archeological resources under Alternative A could also result in a determination of adverse effect if proper avoidance or protective strategies for archeological resources were not implemented.

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

4.3.2 Impacts on Natural Resources

Impacts to natural resources from implementation of Alternative A would result primarily from ground-disturbing activities and restoration of native plant communities. Alternative A would remove all contributing structures, restore areas where there has been ground disturbance, and implement an annual management plan to control invasive, non-native species and improve wildlife habitat. Impacts would generally include short-term, minor, and adverse during and shortly following construction, and beneficial in the long term, as discussed below.

4.3.2.1 Soils

This alternative would remove 74 buildings in the District. Although there would be no excavation to remove foundations and other buried features, those components would be removed if additional ground disturbance was not required. Some grading might be performed to blend the topography of the former building sites into the surrounding landscape. For example, a stone pier or aboveground 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 because of removal of vegetation and compaction of soils by construction equipment. Therefore, short-term, negligible, adverse effects on soils would occur during project implementation if heavy machinery was used to remove 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 roads, and removal of buildings by hand in sensitive areas. All areas where ground disturbance occurred 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 shown in Table 4-3, approximately 2.41 acres of impervious surfaces would be eliminated when the buildings were removed and native vegetation was restored. This is the same area that would be restored in the No Action Alternative. Reducing the area of impervious surfaces would allow for increased infiltration and decreased rates of runoff and soil erosion, providing major, long-term, beneficial effects to soils and nearby waterways. Once vegetation was 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 increased.

4.3.2.2 Biotic Communities

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 by construction equipment and foot traffic. These effects would be short-term and negligible. Directly and indirectly, Alternative A would provide major, long-term benefits to biotic communities by 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 that were described in the No Action Alternative, this alternative would have beneficial effects associated with the 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 would include Appalachian montane oak-hickory forest and eastern white pine successional forest dominated by eastern hemlock in the Wonderland Club. In Millionaire's Row, expansion of the Little River floodplain communities of Appalachian montane oak-hickory forest, early successional Appalachian hardwood dominated by tulip poplar, and southern Appalachian cove forest would be expected.

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

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In Society Hill and Daisy Town, forested areas experienced considerable disturbance because of 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. These communities would expand and mature in these areas with the implementation of Alternative A.

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 National Park Service 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 contributing structures have not been removed because the grounds and buildings have been closed to the public.

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 throughout floodplain and wetland areas (see Table 4-3) once the buildings were 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 infested 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 beyond those described in the No Action Alternative. The District has been surveyed by the National Park Service for invasive, non-native plant species and some treatment to control those species has occurred. Alternative A would increase funding to support management planning and staff to develop a comprehensive eradication plan for invasive, non-native species throughout the District that would be implemented annually. This plan would be revised as conditions changed to achieve 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 in 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.

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 because of 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 National Park Service to minimize the potential for adverse effects to biotic communities (see Section 2.10). Even with incorporation of these measures, the work may result in unavoidable, yet negligible discharges of sediment into aquatic environments.

The indirect effect to aquatic resources in the District would be minor, long-term, and beneficial, resulting from an increase in the vegetation in plant communities near waterways, which would increase infiltration and decrease runoff and soil erosion. Once vegetation was 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 because none are known to occur within or adjacent to the project implementation area. However, this alternative would indirectly provide long-term, minor, beneficial effects to several state and federal species because of expanded and improved wildlife habitat in the District that would result from building removal and revegetation of disturbed areas.

A state-listed threatened species, butternut, and two state special concern species, Fraser's sedge and chamomile grapefern 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 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 National Park Service 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 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 exists 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 would 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. Alternative A, like the No Action Alternative, would remove buildings from approximately 2.4 acres. Because 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 roads in the District. Over the long term, without management to sustain those herbaceous habitats, woody vegetation would eventually encroach on 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.

4.3.2.4 Wetlands

If heavy equipment is used in wetlands within Millionaire's Row, short-term, direct, minor, adverse effects to wetlands would occur during project implementation as a result of disturbance created by these machines. The environment of the wetlands along Bearwallow Branch is not

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suitable for machine traffic or heavy pedestrian traffic because of saturated soil conditions. Although these wetlands may be disturbed during project implementation, this disturbance would be temporary and further minimized through seeding of native species over disturbed soils.

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 ending the chronic disturbance of wetland and nearby upland plant communities. The environment surrounding residential buildings has been subject to runoff from impervious surfaces, soil compaction, input 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 past disturbances resulted 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 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 also use nearby wetland habitat.
- 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 because of 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 did not occur and sediment-laden water did not make its way into nearby 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 would remove all contributing structures across all areas of the District. Effects to water quality would be similar to those described in the No Action Alternative. During construction, there could be indirect, short-term, negligible, adverse effects to water quality because of increased potential for erosion and sedimentation of surface waters. Following the restoration of native vegetation, indirect, moderate, long-term, beneficial effects would occur because of increased soil stabilization, reduced 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 adverse effects to the 100-year floodplain of the Little River or its tributaries as a result of implementing Alternative A. Long-term, direct and indirect, moderate beneficial effects to these floodplains would be experienced through removal of buildings currently in and adjacent to the 100-year floodplains of Jakes Creek, Bearwallow Branch, and the Little River. An increase in the area available for infiltration and flood storage would be a direct benefit because of removal of five buildings in the floodplain. These buildings include Burdette (#16), Miller (#46), Faust (#47), Faust garage (#47A, and Young (#48) [fix map related to cabin 48]. A long-term, major, direct beneficial effect would be an increase in the area for recovery of associated floodplain plant communities, such as the Appalachian montane alluvial forest, that is expected, over time, to regenerate at former building sites. 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 because of Alternative A. However, there would be a temporary increase in air emissions because of the operation of heavy equipment during project implementation. These effects could be minimized by reducing equipment idling times, ensuring that all construction equipment was in good operating condition, and performing construction during the time of year when ozone is least likely to form (October to March). Therefore, the direct, adverse effects to air quality would be short-term in duration and negligible, occurring only during construction.

As shown in Table 4-6, compared to the No Action Alternative, 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 nitrogen oxides and 72.64 tons per year of volatile organic compounds.

4.3.3 Impacts on Interpretation and Visitor Use

Implementation of Alternative A would remove all contributing structures in the District. It would not change the number of visitors to the area and there would be no change in current interpretive programs conducted in the District. However, this alternative would revise the Elkmont Nature Trail brochure to include natural and cultural history information and would install two wayside exhibits. These provisions would create direct, long-term, minor, beneficial effects on interpretation by providing visitors with additional educational materials related specifically to the District.

4.3.3.1 Visitor Experience

Like the No Action Alternative, implementation of Alternative A would have direct and indirect effects on visitor experience that are both adverse and beneficial, depending on the visitor's perception. For those visitors who see the contributing structures in the District as detracting from the aesthetic beauty of the natural environment, Alternative A would provide direct and

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indirect, long-term, major, beneficial effects by removing the buildings from the landscape. Conversely, for visitors who see the contributing structures as an important visual and cultural asset to the District, this alternative would result in direct and indirect, long-term, major, adverse effects on their experience.

Visitor experience would change as a result of implementing Alternative A. Currently, the buildings and adjacent grounds are closed to the public. However, the layout of the District provides multiple opportunities to view the cultural landscapes, including the buildings and smaller-scale features, from existing roads. Thus, the current experience within the District emphasizes contributing structures and cultural resources within their setting. If Alternative A was implemented, visitor experience would change to one focused primarily on natural resource restoration. Interpretive opportunities related to the cultural and natural history of the District would be limited to publications, brochures, nature trail guides, ranger programs, and two wayside exhibits. The addition of interpretive exhibits under this alternative would provide direct, long-term, minor, beneficial effects to the visitor experience.

Noise and other disruptions associated with construction activities in the District would introduce direct, short-term, negligible to minor, adverse impacts on visitor use and experience. These impacts would last only as long as the construction.

4.3.3.2 Visitor Facilities

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

4.3.4 Impacts on Socioeconomic Environment

4.3.4.1 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 *General Management Plan* (NPS 1982b). Implementation of Alternative A would continue to allow for use of public road 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.

4.3.4.2 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 be needed. To avoid impacting campground visitors, construction activities would take place in the winter when the campground was closed. These measures would 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 because of the reduced capacity for trucks carrying heavy loads to accelerate.

In the long-term, effects on circulation would be negligible. Visitation, as indicated by daily trip generation, would not change and the internal circulation would remain consistent with the levels that would occur with the No Action Alternative (see Table 4-7 and Table 4-8). There would not be any change in average speed of travel, percentage of time spent following, or headway between vehicles.

4.3.5 Impacts on Other Resources

4.3.5.1 Viewshed

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. Long-term, direct and indirect, 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 on 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 would 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 would 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 E) indicate the areas visible from a variety of viewpoints throughout the District. The direct effect on the composite viewshed would be long-term, major, and beneficial under Alternative A because of removal of buildings, structures and cultural landscape components. Composite viewshed areas shown (Figures E-7, E-8, and E-9 in Appendix E) would 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 would occur during implementation of Alternative A because of construction activities. The noise emissions from internal combustion-powered equipment (usually diesel engines) would be the primary contributor to sound levels during construction and could 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 to 100 A-weighted decibels. The major sources of construction noise in this alternative may include removal of buildings, hauling, and grading. Construction noise would be relatively short in duration and would be restricted to daytime hours in the winter when visitation typically is lowest.

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As shown in Table 4-9, noise levels following implementation of Alternative A would be the same as those resulting from the No Action Alternative. Noise levels would be in the range of 35 to 60 A-weighted decibels and would never exceed the noise abatement criterion equivalent sound level of 67 A-weighted decibels. The quieter levels in this range would be achieved only at sites having natural conditions that are away from the influence of rivers or creeks with little wind. Alternative A would have a negligible, long-term effect on noise levels in the District once construction activities were completed.

4.3.6 Impacts on NPS Operations

Alternative A would have direct, short-term, moderate to major, adverse effects on park operations because of the requirements for funds and staffing to implement the removal of 49 contributing and 25 noncontributing buildings in the Elkmont District. 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, as described for the No Action Alternative, there would be indirect, major, beneficial effects because of removal of the Elkmont buildings and elimination of the cost to continue stabilization and maintenance activities.

As described in the No Action Alternative, the National Park Service would continue to remove hazard trees at the current level, but would no longer have to repair buildings in the District that were damaged by the trees. As a result, Alternative A would produce an indirect, long-term, major benefit for NPS operations through a reduction in costs associated with staff time and equipment needs.

As with the No Action Alternative, general grounds and roads and trails maintenance and some law enforcement would still be required to monitor visitor use and safety. However, the need for funds and staff to protect the buildings from vandalism or to continue to stabilize and maintain the buildings to prevent further deterioration would be eliminated.

As shown in the costs in Appendix B, the National Park Service would incur increased annual costs to create and implement a more comprehensive, long-range invasive, non-native species management plan. Otherwise, once the buildings were removed, no additional operation and maintenance expenditures would be required beyond what the National Park Service already budgets for the roads, parking, water and wastewater systems, and operations and staffing

4.3.7 Cumulative Effects

The cumulative effects of implementing Alternative A would consist of long-term, major, beneficial effects to natural resources and long-term, 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 would help to lower the potential for contaminants to enter the river. At the same time, restoration of native plant communities not only would increase total vegetation cover, but also would increase the area of available wildlife. Invasive, non-native plant species thrive in disturbance areas and 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 move into surrounding areas of the Park.

Cumulative effects on cultural resources would be similar to those described in the No Action Alternative. The direct, long-term, major, adverse effect on cultural resources in Alternative A also would be major as a cumulative effect. 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 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 management plan for invasive, non-native species. 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 the water quality of the Little River, an Outstanding National Resource Water. Visual quality, aesthetics, and NPS operations would also benefit from Alternative A because of 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 be provided when the District grounds were opened to use by the public following removal of the buildings and structures.

Irretrievable commitments of resources would result if Alternative A was implemented. These commitments would be created primarily by removing the contributing structures within the District. The effects of this loss of cultural resources would be long-term, major, and adverse. There is also the potential for irreversible impacts to archeological resources as a result of implementation of this alternative, but those effects could be eliminated or minimized through proper planning and avoidance measures.

Unavoidable adverse impacts associated with implementing Alternative A primarily would be 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 would retain 12 cabins and the Appalachian Clubhouse in Daisy Town, and remove all other contributing structures in the District, either by mechanical means or by hand. Visitation as a result of implementing Alternative B is not expected to change considerably, but traffic within the District is expected to increase slightly (Table 4-7 and Table 4-8). 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 National Park Service would continue to implement its existing natural resource management activities.

Some changes to parking and circulation within the District would be required. Once construction and structure removal activities were completed, a minor increase in operation and maintenance expenditures would be required beyond what the National Park Service already budgets for the roads, parking, water and wastewater systems, and operations and staffing.

4.4.1 Impacts on Cultural Resources

4.4.1.1 Buildings and Cultural Landscape

Implementation of Alternative B would constitute a direct, long-term, major adverse effect on the buildings within the Elkmont Historic District, and would constitute a direct, long-term, moderate adverse effect on the cultural landscape because of the loss of most buildings and many dominant landscape features. Alternative B would remove 37 buildings listed as contributing in the National Register of Historic Places nomination (Thomason *et al.* 1993), including any 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. One non-contributing cabin would be retained, resulting in a total of 13 buildings retained under Alternative B. Not including the contributing structures that would be removed, much of Elkmont's remaining cultural landscape elements and features 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 effect on the District would be adverse, Alternative B would incorporate the continued use of 12 contributing structures into ongoing Park operations. The long-term preservation of these resources would be assured and would be considered a direct, long-term, minor, beneficial effect to both the buildings and the cultural landscape. The Daisy Town area that includes these cultural resources 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, and contains the only "set-off" cabins in the Park.

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

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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 Standards for the Treatment of Historic Properties* (The Secretary of the Interior 2005).

Where adequate documentation was available, all modern, exterior changes made to cabins after 1940 would be restored to a point within the listed period of significance. This would include, but would not be 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, would be restored to a point within the period of significance. Conspicuous modern additions, such as the deck, side rooms, and rear rooms, would be removed from this building. Based on available documentation, building features that have been altered, such as the porch, posts, railings, and foundation piers, would be restored to a point within the period of significance. This restored building would be important to maintain the spatial relationship of the established streetscape in Daisy Town creating a long-term, moderate, beneficial effect on the Daisy Town streetscape.

Alternative B would introduce new visual elements into the District, including an 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 primarily would be interpretive under Alternative B.

The interpretive exhibits, parking areas, new paths and roads, and stream bank stabilization at eroded culverts would create indirect, long-term, minor, adverse effects 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. The burying of utilities would have minimal, if any, effect on the existing topography, spatial organization, or land use patterns of the historic district or cultural landscape. Once the underground utility lines were installed and the trenches were backfilled, the disturbed ground would be restored to its preconstruction contour and condition. Any adverse impacts associated with the installation of underground utilities would be short-term and negligible.

4.4.1.2 Archeological Resources

The potential for Alternative B to impact archeological resources would depend on the extent and location of ground-disturbing activities. The National Park Service would implement strategies to avoid or minimize impacts on archeological resources. Although Alternative B would remove fewer buildings than the No Action Alternative, its use of heavy equipment and its transport of materials for structural rehabilitation, restoration, and preservation could result in ground disturbance in Daisy Town that would not result with the No Action Alternative. Installation of

new water, sewer, and electrical lines, and paving existing or creating new parking areas also would result in disturbance that could affect archeological resources. All of these adverse effects would be direct and long-term, 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 would include two additional loci where potentially significant resources have been identified. Those resources could be adversely affected by installation of a water line and by the Little River Trail parking area. The impacts to archeological resources because of 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.

4.4.1.3 Section 106 Determinations

Under Section 106 of the National Historic Preservation Act, the removal of 37 contributing buildings within the National Register of Historic Places-listed Elkmont Historic District would constitute an adverse effect. Implementation of this alternative would compromise the layout and spatial patterns among the component resources of the historic district, and its integrity would be lost. The potential effects to archeological resources under Alternative B also could result in a determination of adverse effect if the proper avoidance or protective strategies for archeological resources are not implemented.

All mitigation would be determined through formal consultation with the Tennessee State Historic Preservation Office, the Advisory Council on Historic Preservation, and The Chickasaw Nation, The Eastern Band of Cherokee Indians Tribal Historic Preservation Officers, and other consulting parties, as appropriate. The exact types and cost of the mitigation cannot be calculated at this time.

4.4.2 Impacts on Natural Resources

Impacts to natural resources because of 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 a potential for increased rates of erosion because of soil compaction and removal of vegetation. This alternative would remove 61 buildings in the 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 was necessary for the removal of the buildings. These effects would be mitigated by protocols established by the Park, such as only allowing the use of low-ground-pressure equipment, except for hauling on existing roads, and removing 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

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soils because of 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, impervious surfaces would be added in other areas by the construction of roads and paths. As shown in Table 4-3, a large area of impervious surfaces (2.04 acres) would be eliminated when the 61 buildings were removed. Rates of runoff and soil erosion would decrease in those areas, providing indirect, long-term, moderate benefits to soils. The area that would be newly paved with pervious pavement would total 1.3 acres. As a result, Alternative B would have a net soil gain of 0.74 acres, which would result in a direct, long-term, minor, beneficial effect to soils. Once vegetation was reestablished in areas formerly occupied by buildings, the plants would supply additional protection from erosion by preventing 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 became more established and expanded in area.

Additional activities required under Alternative B that would create direct, long-term, minor to moderate, adverse effects would include paving of four parking areas with pervious pavement, installation of new water and sewer lines and underground electrical lines, road repairs, and road and path construction. All of these activities would cause new ground disturbance and would result in adverse effects to soils over a wider area in the District than in the No Action Alternative. In the long term, because the number of visitors would only increase by a small amount (see Table 4-7), and the estimated increase in internal pedestrian trips would be minimal (see Table 4-8), 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 1 inch of precipitation and would produce higher rates of runoff than undisturbed, vegetated surfaces. The long-term, indirect, adverse effects would be negligible following implementation of Alternative B, with only a 0.8 percent increase in surface water runoff over the existing condition (Table 4-5). 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 used for parking.

In Society Hill, Alternative B would restrict vehicular access along Jakes Creek Road south of Daisy Town by relocating a gate. This 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*

Terrestrial Plant Communities. Direct, adverse effects to biotic communities would result during construction as plants were disturbed by construction equipment. These effects would be negligible and short-term. The District would directly and 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 contributing structures 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 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. These communities would expand and mature in this area with the implementation of the Alternative B.

The majority of the Daisy Town buildings would be retained under Alternative B, which would eliminate the potential for expansion of plant communities on those sites. Chronic disturbance from pedestrian traffic and vegetation management would continue in this area of the District.

Retention of contributing structures in Daisy Town would require hazard tree removal beyond that which would be required in the No Action Alternative. For historic buildings and grounds that have public access, the National Park Service intensely manages the surrounding landscape. 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, and would truncate the age/size distribution by removing old or large trees that are identified as hazards and eliminating much of the old growth stage of development. This action would adversely affect plant communities primarily throughout Daisy Town. These long-term, direct and indirect, adverse effects would be minor, but would increase incrementally as more buildings were retained because additional hazard tree management would be required. In the remainder of the District, removal of the buildings would allow forests to eventually 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 in floodplain and wetland areas (see Table 4-3). This expansion could occur once the buildings were removed and hazard tree management was 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 would be the same as that which would occur under the No Action Alternative.

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 because of 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 National Park Service to minimize the potential for adverse effects to biotic communities (see Section 2.10). Even with

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incorporation of these measures, unavoidable, yet negligible discharges of sediment into aquatic environments could occur.

The indirect effect to aquatic resources in the District would be minor, long-term, and beneficial. It would result from the increase in vegetation that would occur in nearby plant communities and their effectiveness in increasing infiltration and decreasing runoff and soil erosion. Once vegetation was 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 federally listed endangered or threatened species because 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, beneficial effects to several state and federal species because of expanded and improved wildlife habitat in the District. A state-listed threatened species, butternut, and two state special concern species, Fraser's sedge and chamomile grapefern occur within the District. Implementation of Alternative B would create the potential for existing populations of these species to expand into revegetated areas. Similar benefits would 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 National Park Service 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 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 exists 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 would 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. Alternative B would remove buildings, which would result in a short-term increase in the moist, grassy areas where synchronous fireflies are often found. However, over the long term, without management to sustain those herbaceous habitats, woody vegetation would encroach on 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

If heavy equipment was used in wetlands within Millionaire's Row, short-term, direct, minor, adverse effects to wetlands would occur during project implementation as a result of disturbance created by these machines. The environment of the wetlands along Bearwallow Branch is not suitable for machine traffic or heavy pedestrian traffic because of saturated soil conditions.

Although these wetlands may 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 the Elkmont 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 adjacent to proposed parking areas are subject to runoff and deposition of petrochemicals, creating indirect, long-term, negligible, adverse effects. Wetlands near-existing buildings that would be removed under this alternative would benefit from elimination of these chronic disturbances. This action would create indirect, long-term, minor, beneficial effects.

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 plant diversity. Wildlife species that migrate into areas formerly occupied by buildings would also be able to use nearby wetland habitat.
- The aesthetic/visual quality value of wetlands would be improved by planting those 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 because of the increased area available for infiltration, and the reduction in the area of impervious surfaces. In addition, repair of culverts to correct erosion problems would provide indirect benefits by reducing soil erosion and the resulting sediment-loading of water that enters nearby wetlands or floodplains.
- The recreational value of the wetlands potentially would 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

Surface Water Runoff. Alternative B would change surface water runoff rates and volumes, and would require additional discharge of treated effluent into the Little River. Because the Little River is listed as an Outstanding National Resource Water, any adverse effect could create considerable impacts. Potential impacts to water quality resulting from implementation of Alternative B are described below.

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The indirect, adverse effects on water quality resulting during project implementation would be short-term and negligible, and primarily would be caused by disturbance created by heavy equipment used to remove buildings and to transport materials into areas where buildings were being restored, rehabilitated, and/or preserved. Although best management practices would be followed, there would still be the potential for erosion from disturbed areas and sedimentation into water bodies.

In areas where buildings would be removed and vegetation reestablished, a total of 0.74 acres of impervious surfaces would be eliminated. This action would reduce runoff that could contaminate District waterways and would provide long-term, indirect, minor benefits to water quality.

All of the proposed infrastructure components (water lines, sewer lines, electrical service, parking areas, and walking paths) 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 would be suspended under bridges to cross streams, rather than being placed under the streambed. Where lines could not be hung from bridges, they would be bored under the streambed, which would avoid 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 it is 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 would result from implementing Alternative B. This small quantity would have an indirect, long-term, negligible, adverse 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, while an additional 1,300 gallons per day of wastewater would require treatment during the peak day under this alternative, the total amount of discharged pollutants would remain at baseline levels.

There are not any baseline conditions established for thermal loading, other than typical wastewater temperatures of 60° Fahrenheit (see Section 3.2.4.4). However, the incremental increase in effluent discharged in this alternative would result in negligible temperature effects in the Little River. The effluent discharge *rate* would remain the same as the existing condition (40 gallons per minute) under all alternatives. At the current rate of discharge, thermal impacts are dissipated entirely within 3 feet of the discharge pipe. Because 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.

The sewer line under Jakes Creek that would 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 in-stream impacts to both Jakes Creek and the Little River.

Because 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 4-4). Therefore, rehabilitation and reuse of the Appalachian Clubhouse would have a negligible effect on water quality.

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 ^{a/}	None	35,000	30,000
A	None	35,000	30,000
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

a/ represents the capacity of the existing wastewater treatment plant servicing the Elkmont Campground.

Table 4-11: Estimated Discharge Pollutants by Alternative

Condition	Flow (gallons per day)	BOD (mg/L) ^{/a}	TSS (mg/L)	BOD (pounds)	TSS (pounds)
Baseline (No Action Alternative and Alternatives A, B, C, D, and E1)	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

BOD = Biological oxygen demand. TSS = Total suspended solids. mg/L = Milligrams per liter.

All Water Pollutant Discharges. Collective annualized averages for all water quality contaminant constituents under Alternative B were calculated at levels at least 10 times lower and often 100 times lower than the water supply maximum contaminant level. (An estimation of maximum potential impacts under any alternative is included in the evaluation of Alternative F.) Because the estimated contaminant level from runoff is very low, it would also not affect water quality.

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4.4.2.6 *Floodplains*

There would be no direct, adverse effects to the 100-year floodplain of the Little River or its tributaries as a result of implementing Alternative B. Long-term, direct and indirect, moderate, beneficial effects to these floodplains would be achieved through removal of buildings currently in and adjacent to the 100-year floodplains of Jakes Creek, Bearwallow Branch, and the Little River. An increase in the area available for infiltration and flood storage would be a direct benefit because of removal of five buildings in the 100-year floodplain. These buildings include Burdette (#16), Miller (#46), Faust (#47), Faust garage (#47A), and Young (#48). A long-term, major, direct, beneficial effect would be an increase in the area for establishment of associated floodplain plant communities, such as the montane alluvial forest, that is expected to regenerate at former building sites.

Restricting vehicular access and removing buildings in areas adjacent to floodplains would provide direct and indirect, long-term, minor benefits by increasing the area available for infiltration, thereby reducing the demand for flood storage within the floodplains. Additional indirect, long-term, minor 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 could be affected by increases in vehicular traffic emissions 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 roads, within parking areas, at gates, and at destination points that are visible from the road, such as at wayside exhibits. Longer idling times result in increased emissions.

Compared to 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 because of 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 performing construction during the time of year when ozone is least likely to form (October to March).

Air quality modeling was performed to determine the effects of automobile emissions from Alternative B on nitrogen dioxide generation and nitrogen deposition. The analysis ran the CALPUFF model from the U.S. Environmental Protection Agency the screening mode for 5 years using National Weather Service data from Knoxville, Tennessee.

- As a worst case, the 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, was modeled. The high use scenario assumed 8 tons per year of nitrogen oxide vehicle emissions and the moderate use scenario assumed 4 tons per year of nitrogen oxide vehicle emissions.
- Two different season lengths were analyzed. One season length assumed 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 a.m.
- Nitrogen deposition was calculated for the distances of 9 miles and 11 miles to reflect the distances to Clingmans Dome and Noland Divide, respectively.

The analysis results showed 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 (1×10^{-4}) of the nitrogen deposition threshold.
- The visible haze analysis indicated no visible haze impacts.
- The maximum impact of nitrogen dioxide to the annual nitrogen dioxide Class I Prevention of Significant Deterioration increment was approximately 0.017 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$), or one-sixth of the U.S. Environmental Protection Agency's Class I significance level of 0.1 micrograms per cubic meter.

A visible plume analysis was performed using the U.S. Environmental Protection Agency's VISCREEN model in the Level 1 mode. The results indicated that there will not be a visible plume impact from the vehicle emissions.

In an air quality assessment based on a busy Saturday in the summer, the year 2015 air emissions that would result from Alternative B were estimated to be 50.37 tons per year of nitrogen oxides and 72.64 tons per year of volatile organic compounds (see Table 4-6). These figures represent no change from the No Action Alternative. 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 would require removal of most of the contributing structures in the District. Removal of the buildings would not 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 would include illustrated talks and guided hikes that would 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 would change considerably as a result of implementing Alternative B. Although removal of most of the buildings and restoration and preservation of others would not substantially 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 directly and 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.

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Currently, the buildings and adjacent grounds are closed to the public. However, the District provides multiple opportunities to view the intact cultural landscapes, including the buildings and smaller-scale features, from existing roads only. 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.

For visitors who want buildings removed, Alternative B would provide direct and indirect, moderate to major, long-term, beneficial effects to the visitor experience by removing 36 contributing buildings and 24 non-contributing buildings from the landscape. For this same group, direct and indirect, minor, adverse effects would be experienced because of the retention of 13 buildings.

For visitors who see the contributing structures as an important visual and cultural asset, this alternative would have direct and indirect, long-term, moderate to major, adverse effects on their experience because of removal of buildings in the Wonderland Club, Millionaire's Row, and Society Hill. For those who want buildings retained, this Alternative would provide direct and indirect, long-term, minor beneficial effects because of the retention and restoration and preservation of 13 buildings in Daisy Town.

The addition of wayside exhibits and, interior exhibits, and of updating the trail brochure in Alternative B would provide all visitors with direct and indirect, long-term, moderate, beneficial effects. These actions and improvements would provide visitors with an understanding of what they were viewing in the District and would enable them to associate a sense of time and place with the buildings.

Alternative B would have indirect, long-term, negligible adverse effects on the visitor experience because of an increase in visitor activities creating additional congestion within the District. Noise and other disruptions associated with construction activities in the District would introduce direct, short-term, negligible to minor, adverse impacts on visitor use and experience. These impacts would last only as long as the construction.

4.4.3.2 Visitor Facilities

Visitor facilities would experience long-term, minor to moderate, direct and indirect benefits as a result of implementing Alternative B. Although most of the contributing structures would be removed under this alternative, several visitor facilities would be added, including eight wayside exhibits, an orientation kiosk with self-guiding tour booklet, and an update to the Elkmont Nature Trail brochure. Additional exhibits installed inside the Appalachian Clubhouse would provide historical information and pictures. These exhibits would serve as a self-guiding museum. In addition, 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 of the town of Elkmont, appreciate the development of the Appalachian and Wonderland Clubs and train stations, and 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 entered the District and at most of the major sections of the District, including the campground.

Other long-term, minor to moderate benefits to visitor facilities that would be provided by Alternative B would include construction or repaving of four parking areas in the District, repaving or widening of 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 that is expected by the visiting public in a national park. In addition, day use and restroom facilities at the Appalachian Clubhouse would be accessible to the visiting public and would help to decrease the demand on campground facilities. By reducing the need for visitors to drive into the campground to access restrooms, Alternative B would eliminate some of the potential disturbance to campers.

4.4.4 Impacts on Socioeconomic Environment

4.4.4.1 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 *General Management Plan* (NPS 1982b).

Implementation of Alternative B would continue to allow for use of public road corridors, accommodations at the existing quarters, and picnicking and camping at the Elkmont Campground. Historical and natural resource interpretation would be increased over that offered in the No Action Alternative through NPS programs and printed material, installation of exhibits, retention of some buildings for interpretive uses, and use of 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.

4.4.4.2 Access and Circulation

During implementation, Alternative B would create direct, short-term, negligible, 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 in the winter. These measures would 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 because of the reduced ability for trucks carrying heavy loads to accelerate.

Once implemented, Alternative B would provide 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 only expected to increase by a small amount, this alternative is not likely to affect access and circulation. An increase in total

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daily exterior 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 per day in the No Action Alternative to 435 per day in Alternative B, with no change in internal, two-way vehicular trips (Tables 4-7 and 4-8).

A number of road 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 an indirect, 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 roads. There would not be any changes 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

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*, represented by the No Action Alternative, was implemented.

In addition to retention of some buildings, Alternative B would retain foundations, rock walls, and other cultural landscape components. Long-term, indirect, minor, adverse effects on viewsheds would be created by retaining 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 direct and indirect, 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 E depict the existing views of a variety of contributing structures and provide simulations of the potential views following removal of these buildings.

Direct, adverse impacts to the District viewshed would occur during implementation of Alternative B 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 in Appendix E 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 because of retention of some buildings, structures, and cultural landscape components. Composite viewshed

areas shown in Figures E-7, E-8, and E-9 in Appendix E 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 would occur during implementation of Alternative B because of construction activities. The noise emissions from combustion-powered equipment, including diesel engine earth moving equipment, would be the primary contributors to the sound levels during construction, and could 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 to 100 A-weighted decibels. The major sources of construction noise in this alternative may include removal of buildings, hauling, grading, and paving. Construction noise would be relatively short in duration and would be restricted to daytime hours in winter when visitation is lowest. After construction was completed, levels under Alternative B would likely be in the range of 50 to 60 A-weighted decibels (see Table 4-9).

4.4.6 Impacts on NPS Operations

Alternative B would have direct, short-term, moderate to major, adverse effects on Park operations because of the requirements for funds and staffing to implement the removal of 36 contributing and 24 noncontributing buildings in the Elkmont District. In addition to the removals, Alternative B would expand the infrastructure, increase the number of parking lots and paved pathways, restore 12 cabins in Daisy Town for use as interpretive exhibits, and restore and rehabilitate the Appalachian Club for day use. While construction and preservation work was underway, there would be direct, short-term, minor, adverse effects on operations because of staffing and funding requirements to complete the work.

All of the new visitor facilities, exhibits, and infrastructure would have to be maintained by NPS staff, which would result in direct and indirect, long-term, minor, adverse effects on operations. However, the elimination of 36 contributing structures and the attendant stabilization, maintenance, and policing requirements would result in indirect, long-term, moderate, beneficial effects on park operations. Therefore, although costs would be associated with maintaining the 13 buildings and the upgraded infrastructure (for example, cleaning the pervious pavement and maintaining exhibits), this cost would be substantially reduced compared to the No Action Alternative. 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 result from the removal of the Elkmont buildings and the health and safety hazards they pose to Park staff and visitors. For example, the buildings harbor animals that potentially can serve as vectors for diseases that are fatal to humans, including hanta virus, which is spread by rodents, and histoplasmosis, which is spread by bats and birds. Some of the buildings contain debris, including broken glass, fallen plasterboard, and lead-based paint. Removal of hazards that pose a danger to the visiting public and Park staff would reduce the need for NPS law enforcement in the District and special maintenance precautions, and would provide long-term, moderate benefits to NPS operations.

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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, the National Park Service 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 buildings. Some of the expenditures required for vegetation management adjacent to the buildings would be eliminated as buildings were removed, indirectly benefiting NPS operations through a reduction in costs associated with staff time and equipment needs. However, the direct and indirect effect on NPS operations because of hazard tree and other vegetation management would be minor, long-term, and adverse because additional areas of the District and the grounds beside the area that is currently open to the public would be opened and would require aggressive vegetation management. Hazard trees adjacent to exhibits, trails, and roads would be removed as needed to reduce the risk 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. Reestablishment of native plant communities would provide 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. The reduction in runoff and elimination of erosion that would result from this alternative would help to lower the potential for contaminants to enter the river. Restoration of native plant communities not only would increase total vegetation cover, but also would increase the area of available wildlife habitat 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. Revegetation 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 spread into surrounding areas of the Park.

The loss of above-ground cultural resources in Alternative B would result in a long-term, 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 east Tennessee (Thomason *et al.* 1993). When added to past actions, implementation of this alternative would cumulatively result in the 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 District's natural resources, including soils; floodplains; aquatic and terrestrial communities; wetland functional values; habitat for threatened, endangered, rare, and sensitive species; and water quality. The long-term

productivity of all biotic resources would be benefited because of 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 because of 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.

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 contributing structures within the District. Direct, long-term, major, adverse effects to aboveground cultural resources would occur because of removal of many of the contributing structures 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 because of increased use to view exhibits. There is also a potential for irreversible impacts to archeological resources, but those effects could be eliminated or minimized through proper planning and avoidance measures.

Unavoidable adverse impacts associated with implementing Alternative B would primarily be 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 air emissions from construction equipment; and the short-term, adverse effects on visual quality and aesthetics during and immediately following construction, before disturbed areas were revegetated. Visual quality and aesthetics would experience minor, adverse impacts because of the 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 would retain 16 cabins and the Appalachian Clubhouse in Daisy Town, the Chapman cabin (#38) in Society Hill, and the Spence cabin (#42) in Millionaire's Row. It would remove all other contributing structures in the District, either by mechanical means or by hand.

While visitation to the District following implementation of Alternative C would not change considerably, traffic within the District would increase (Table 4-7). Existing recreational use would continue. 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 National Park Service 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 National Park Service already budgets for the roads, parking, water and wastewater systems, and operations and staffing.

4.5.1 Impacts on Cultural Resources

4.5.1.1 Buildings and Cultural Landscape

Implementation of Alternative C would constitute a direct, long-term, major, adverse effect on the buildings within the Elkmont Historic District, and would result in a direct, long-term, moderate, adverse effect on the cultural landscape because of the loss of most buildings and many dominant landscape features. Alternative C would remove 31 buildings listed as contributing in the nomination form for the National Register of Historic Places, including any remains of the Wonderland Hotel, the Wonderland Hotel Annex, 26 cabins, and 3 garages. The alternative would retain 18 contributing buildings, including the Appalachian Clubhouse and 17 cabins. Also as part of Alternative C, one non-contributing cabin would be retained, resulting in a total of 19 buildings retained under Alternative C. Not including the contributing structures, the majority of Elkmont's cultural landscape elements and features would also be retained under this alternative.

Of the 31 contributing buildings proposed for removal, 25 buildings were listed as being in "poor" or "fair to poor" condition in a 2003 survey. Of these buildings, Cabin #36 has substantial portions that have collapsed, the Wonderland Hotel was removed following a major collapse in August 2005, and at least four other cabins have substantial problems with structural integrity. The Wonderland Hotel was documented for the Historic American Building Survey in 2003.

Because Alternative C would remove 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 National Register of Historic Places staff, it has been determined that, following implementation of this alternative, the buildings and landscape features retained at the Appalachian Club (Daisy Town) would constitute a small historic district that would be eligible

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for listing in the National Register of Historic Places. The name, boundary, and contributing features of this historic district would not be the same as the existing Elkmont Historic District. If Alternative C were to be implemented, the Park would prepare an amendment to the documentation for the Elkmont Historic District. This additional documentation would accurately reflect the appearance and characteristics of the resources retained within Elkmont. As part of this National Register amendment process, the National Park Service would provide additional documentation, along with the cultural landscape and significant associated features and elements that were not included in the original nomination. One purpose of the amended nomination would be to accurately describe the significance and integrity of the District, based on the resources that exist following implementation of Alternative C.

While the effect on the historic district would be adverse, because Alternative C incorporates the continued use of 18 contributing (and one non-contributing) structures into ongoing Park operations, the long-term preservation of these resources would be assured. This would result in a direct, long-term, minor, beneficial effect to both the buildings and the cultural landscape.

This alternative would preserve 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 construction techniques and building materials, and includes the only "set-off" cabins in the Park. The Appalachian Clubhouse and the Spence cabin would be rehabilitated for public day-use. 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. Cultural landscape characteristics and features of Elkmont, such as stone walls, stone bridges and culverts, other stone structures, and circulation patterns, would be retained under this alternative, as would other cultural landscape features.

Where adequate documentation is available, all modern, exterior changes made to cabins that post-date 1940, would be restored to a point within the listed period of significance. This would include, but would not be 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, would be restored to a point within the period of significance. Conspicuous modern additions, such as the deck, side rooms, and rear rooms, would be removed from this building. Based on available documentation, building features that have been altered, such as the porch, posts, railings, and foundation piers, would be restored or reconstructed to a point within the period of significance. Retention of the Swan cabin would assist efforts to maintain the spatial relationship of the existing Daisy Town streetscape. The preservation of the retained cabins and rehabilitation of the clubhouse would be conducted in accordance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (The Secretary of the Interior 2005). These actions would have a long-term, moderate, beneficial effect on the Daisy Town streetscape.

Alternative C 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 primarily would be interpretive under Alternative C.

The interpretive exhibits, parking areas, new paths and roads, and stream bank stabilization at eroded culverts would create indirect, long-term, 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. The burying of utilities would have minimal, if any, effect on the existing topography, spatial organization, or land use patterns of the historic district or cultural landscape. Once the underground utility lines were installed and the trenches were backfilled, the disturbed ground would be restored to its preconstruction contour and condition. Any adverse impacts associated with the installation of underground utilities would be short-term and negligible.

4.5.1.2 Archeological Resources

The potential for Alternative C to impact archeological resources would depend on the extent and location of ground-disturbing activities. The National Park Service would implement strategies to avoid or minimize any impacts on archeological resources. Although Alternative C would remove fewer buildings than the No Action Alternative, restoration, rehabilitation and preservation activities could result in ground disturbance in Daisy Town and adjacent to the Chapman cabin (#38) in Society Hill and the Spence cabin (#42) in Millionaire's Row. Installation of new sewer, water and electrical lines to the Appalachian Club and construction of parking areas also would result in 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 impacts to archeological resources because of 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.

4.5.1.3 Section 106 Determinations

Under Section 106 of the National Historic Preservation Act, the removal of 31 contributing buildings within the National Register of Historic Places-listed Elkmont Historic District would constitute an adverse effect. The 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.

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All mitigation would be determined through formal consultation with the Tennessee State Historic Preservation Office, the Advisory Council on Historic Preservation, The Chickasaw Nation and The Eastern Band of Cherokee Indians Tribal Historic Preservation Officers, and other consulting parties, as appropriate in accordance with the provisions of the National Historic Preservation Act and all other applicable federal laws and regulations. See the mitigation section in Chapter 2.10 for measures proposed by the National Park Service for mitigating adverse effects on cultural resources.

4.5.1.4 Proposed Mitigation

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 would be minor and within acceptable limits of change.

4.5.2 Impacts on Natural Resources

Impacts to natural resources because of 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 would remove 56 buildings total in Elkmont Historic District. Short-term, moderate, adverse effects on soils would occur during project implementation if the use of heavy machinery and other demolition equipment was necessary for removal of the buildings. These effects would be mitigated by protocols established by the National Park Service, such as allowing only the use of low-ground-pressure equipment (except for hauling on existing roads) and removing buildings by hand in sensitive areas. All areas of ground disturbance would be seeded with native species following project completion. Therefore, the adverse effects on soils because of demolition and construction activities would be short-term.

Short-term, moderate, adverse effects to soils would occur as a result of installation of new water and sewer lines, underground electrical lines, parking areas, 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, because the increase in internal pedestrian trips is likely to be minimal (see Table 4-8), the soil compaction and related adverse impacts to plants from trampling would be negligible.

Additional activities required under this alternative that would create direct, long-term, moderate adverse effects include the construction of four parking areas; installation of water, sewer and electrical lines; expansion of the wastewater treatment plant; road repairs and minor widening;

and the installation of paths. All of these activities would cause disturbance to soils over a larger area in the District than the No Action Alternative.

Effects on soils would result from some elimination and some addition of paved or impervious surfaces. About 1.88 acres of impervious surfaces would be eliminated when the 56 buildings were removed (see Table 4-3). Rates of runoff and soil erosion would decrease in those areas and long-term beneficial effects on soils and adjacent waterways would be provided. Other elements would involve paving 1.3 acres with pervious pavement. Restored ground would be greater than areas covered by pavement providing direct, long-term, minor beneficial effects to soils. Once vegetation was 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.

Although pervious concrete would be used in parking areas and some infiltration is possible where this material is used, the surface is only able to absorb the first 1 inch of precipitation and would produce higher rates of runoff than undisturbed, vegetated surfaces. Additional rain water cannot penetrate pervious pavement and would run off 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 result in increased sedimentation into area streams and degradation of water quality because of contamination of runoff with petrochemicals and other contaminants from automobiles. These impacts would create long-term, indirect, negligible, adverse effects within the study area.

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

4.5.2.2 Biotic Communities

Terrestrial Plant Communities. Direct, adverse effects to biotic communities would occur during construction as plants were disturbed by construction equipment. These effects would be negligible and short-term. However, the District would directly and 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 forest located within the floodplain of

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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. These communities would expand and mature in this area with the implementation of the Alternative C.

The majority of the Daisy Town buildings would be retained under Alternative C, which would eliminate the potential for expansion of plant communities on those sites. Chronic disturbance from pedestrian traffic and vegetation management would continue in this area of the District.

Retention of buildings in Daisy Town and the Chapman cabin (#38) in Society Hill would require hazard tree removal beyond that which would be required in the No Action Alternative. For historic buildings and grounds that have public access, the National Park Service intensely manages the surrounding landscape. 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 and would truncate the age/size distribution by removing old or large trees that are identified as hazards and eliminating much of the old growth stage of development. This action would adversely affect plant communities primarily throughout Daisy Town. These long-term, direct and indirect, adverse effects would be minor, but would increase incrementally as more buildings were retained because additional hazard tree management would be required. In the remainder of the District, removal of buildings would allow forests to eventually 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 in floodplain and wetland areas (see Table 4-3). This expansion could occur once the buildings were removed and hazard tree management was 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 would be the same as that which would occur under the No Action Alternative.

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 because of 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 National Park Service to minimize the potential for adverse effects to biotic communities (see Section 2.10). Even with incorporation of these measures, unavoidable, yet negligible discharges of sediment into aquatic environments could occur.

The indirect effect to aquatic resources in the District would be minor, long-term, and beneficial. It would result from the increase in vegetation that would occur in nearby plant communities and their effectiveness in increasing infiltration and decreasing runoff and soil erosion. Once vegetation was 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 federally listed endangered or threatened species because 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, beneficial effects to several state and federal species because of expanded and improved wildlife habitat in the District. A state-listed threatened species, butternut, and two state special concern species, Fraser's sedge and chamomile grapefern occur within the District. Implementation of Alternative B would create the potential for existing populations of these species to expand into revegetated areas. Similar benefits would 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 National Park Service 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 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 exists 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 would 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. Alternative C would remove buildings, which would result in a short-term increase in the moist, grassy areas where synchronous fireflies are often found. However, over the long term, without management to sustain those herbaceous habitats, woody vegetation would encroach on 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

If heavy equipment was used in wetlands within Millionaire's Row, short-term, direct, minor adverse effects to wetlands would occur during project implementation as a result of disturbance created by these machines. The environment of the wetlands along Bearwallow Branch is not suitable for machine traffic or heavy pedestrian traffic because of saturated soil conditions.

Any 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. Wetlands adjacent to proposed parking areas would be

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subject to runoff and deposition of petrochemicals, creating indirect, long-term, negligible adverse effects.

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 plant diversity. Wildlife species that migrate into areas formerly occupied by buildings would also be able to use nearby wetland habitat.
- The aesthetic/visual quality value of wetlands would be improved by planting those 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 because of the increased area available for infiltration, and the reduction in the area of impervious surfaces. In addition, repair of culverts to correct erosion problems would provide indirect benefits by reducing soil erosion and the resulting sediment-loading of water that enters nearby wetlands or floodplains.
- The recreational value of the wetlands potentially would 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*

Surface Water Runoff. 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. Because the Little River is listed as an Outstanding National Resource Water, any adverse effect could create considerable impacts. Potential impacts to water quality resulting from implementation of Alternative C are described below.

The indirect, adverse effects on water quality resulting during project implementation would be short-term and negligible, and primarily would be caused by disturbance created by heavy equipment used to remove buildings and to transport materials into areas where buildings were being restored, rehabilitated, and/or preserved. Although best management practices would be followed, there would still be the potential for erosion from disturbed areas and sedimentation into water bodies.

Once the areas where buildings were removed were planted and the vegetation became established, a total of 0.58 acres of impervious surfaces would have been eliminated (see Table 4-3). This action would reduce runoff that could contaminate District waterways and would provide long-term, indirect, minor benefits to water quality.

All of the proposed infrastructure components (water lines, sewer lines, electrical service, parking areas, and walking paths) 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 would be suspended under bridges to cross streams, rather than being placed under the streambed. Where lines could not be hung from bridges, they would be bored under the streambed, which would avoid 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 it is 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 would result from implementing Alternative C. This small quantity would have an indirect, long-term, negligible, adverse 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. As shown in Tables 4-10 and 4-11, while an additional 1,300 gallons per day of wastewater would require treatment during the peak day under this alternative, the total amount of discharged pollutants would remain at baseline levels.

Temperature effects on the Little River from effluent discharges would be. The effluent discharge *rate* would remain the same as the existing condition (40 gallons per minute) under all alternatives. At the current rate of discharge, thermal impacts are dissipated entirely within 3 feet of the discharge pipe. Because 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.

Installation of the sewer line under Jakes Creek to serve the Appalachian Clubhouse would be above the Little River confluence with Jakes Creek. This location would minimize in-stream impacts to both Jakes Creek and the Little River.

Because 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 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 4-4). Therefore, rehabilitation and reuse of the Appalachian Clubhouse would have a negligible effect on water quality.

All Water Pollutant Discharges. 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. (An estimation of maximum potential impacts under any alternative is included in the evaluation of Alternative F.) Because the estimated contaminant level from runoff is very low, it would also not affect water quality.

4.5.2.6 Floodplains

There would be no direct, adverse effects to the 100-year floodplain of the Little River or its tributaries as a result of implementing Alternative C. Long-term, direct and indirect, moderate beneficial effects to the 100-year floodplain would be achieved through removal of any impervious surfaces currently in and adjacent to the floodplains of Jakes Creek, Bearwallow Branch, and the Little River. An increase in the area available for infiltration and flood storage would be a direct benefit from removal of five buildings in the 100-year floodplain. These

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buildings include Burdette (#16), Miller (#46), Faust (#47), Faust garage (#47A), and Young (#48). A long-term, major, direct beneficial effect would be an increase in the area for recovery of associated floodplain plant communities, such as the montane alluvial forest, that is expected to regenerate at former building sites.

Restricting vehicular access and removing buildings in areas adjacent to floodplains would provide direct and indirect, long-term, minor benefits by increasing the area available for infiltration, thereby reducing the demand for flood storage within the floodplains. Additional indirect, long-term, minor 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.

4.5.2.7 Air Quality

Air quality could be affected by increases in vehicular traffic emissions 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 roads, within parking areas, at gates, and at destination points that are visible from the road, such as at wayside exhibits. Longer idling times result in increased emissions.

Compared to 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 because of 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 (October to March).

Once construction was completed, increased traffic within the District and construction of parking lots in the Appalachian and Wonderland Clubs could affect the quantity of emissions discharged into the District. As described in Section 4.4.2.7, an analysis was performed to evaluate the potential nitrogen deposition and nitrogen dioxide impacts from these uses. The results of an analysis showed 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 (1×10^{-4}) of the nitrogen deposition threshold.
- The visible haze analysis indicated no visible haze impacts.
- The maximum impact of nitrogen dioxide to the annual nitrogen dioxide Class I Prevention of Significant Deterioration increment was approximately 0.017 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$), or one-sixth of the U.S. Environmental Protection Agency's Class I significance level of 0.1 micrograms per cubic meter.

A visible plume analysis was performed using the U.S. Environmental Protection Agency's VISCREEN model in the Level 1 mode. The results indicated that there will not be a visible plume impact from the vehicle emissions.

In an air quality assessment based on a busy Saturday in the summer, the year 2015 air emissions that would result from Alternative C were estimated to be 50.37 tons per year of nitrogen oxides and 72.64 tons per year of volatile organic compounds (see Table 4-6). These figures represent no

change from the No Action Alternative. As a result, no indirect effects to air quality are anticipated as a result of implementing Alternative C.

4.5.3 Impacts on Interpretation and Visitor Use

Implementation of Alternative C would require removal of many of the contributing structures in the District. Removal of the buildings would not change the number of visitors to the area, although there would be a moderate increase in the number of 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. An exhibit would be installed inside the Appalachian Clubhouse, and the clubhouse would serve as a self-guiding museum. These provisions would have direct and indirect, long-term, moderate, beneficial effects on interpretation by providing visitors with materials and displays relating specifically to the District.

4.5.3.1 Visitor Experience

Although removal of many of the buildings and restoration and preservation of others is not expected to substantially 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 directly and indirectly have long-term, moderate, beneficial effects 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. In Society Hill, the exterior of the Chapman cabin (#38) would be restored and visitors would have opportunities to learn about Colonel Chapman's role in the establishment of the Park. In Millionaire's Row, visitors would have day use opportunities at the rehabilitated Spence Cabin. 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 allowing 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. However, the District provides multiple opportunities to view the intact cultural landscapes, including the buildings and smaller-scale features, from existing roads only. Thus, the focus on the portion of the District that contains buildings is on investigation and discovery of cultural resources within their setting. Under Alternative C visitor experience would change to one that balances natural resource restoration with increased cultural resource interpretive opportunities provided by wayside exhibits, the retention of selected cabins, day use of the Appalachian Clubhouse with interior exhibits, and preservation of cultural landscape elements.

Alternative C would provide direct and indirect, moderate, long-term, beneficial effects to visitors who see the buildings as detracting from the natural environment by removing 31 contributing buildings and 24 non-contributing buildings from the landscape. For this group, direct and

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indirect, minor, adverse effects would be experienced because of the retention of 19 buildings, plus stone walls and chimneys.

For visitors who see the contributing structures as an important visual and cultural asset, this alternative would have direct and indirect, long-term, moderate, adverse effects on their experience because of removal of buildings in the Wonderland Club, and most of Millionaire's Row and Society Hill. For this group, Alternative C would provide direct and indirect, long-term, minor beneficial effects because of the retention of contributing structures in Daisy Town, the Chapman cabin in Society Hill, and the Spence cabin in Millionaire's Row.

Alternative C would provide direct and indirect, long-term, moderate, beneficial effects for all visitors because of the addition of wayside exhibits, interior exhibits, and updating of the trail brochure. These actions and improvements would provide visitors with an understanding of what they were viewing in the District and would enable them to associate a sense of time and place with the buildings.

Alternative C would have indirect, long-term, negligible to minor adverse effects on the visitor experience because of an increase in visitor activities that would create additional congestion within the District. Noise and other disruptions associated with construction activities in the District would introduce direct, short-term, negligible to minor, adverse impacts on visitor use and experience. These impacts would last only as long as the construction.

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 many of the contributing structures would be removed under this alternative, several visitor facilities would be added, including eight wayside exhibits, an orientation kiosk with exhibits, and interior exhibits at the Appalachian Clubhouse. These exhibits would provide visitors with information on the natural environment and would interpret the cultural resources. With the addition of the exhibits, visitors would gain another opportunity to understand the history of the town of Elkmont, appreciate the development of the Appalachian and Wonderland Clubs and train stations, and 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 entered 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 walking paths, and restoring and rehabilitating the Appalachian Clubhouse. In addition, day use and restroom facilities and interior interpretive exhibits at the Appalachian Clubhouse would be accessible to the visiting public and would reduce 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 that is 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

4.5.4.1 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 *General Management Plan* (NPS 1982b).

Implementation of Alternative C would continue to allow for use of public road 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 offered in the No Action Alternative through installation of exhibits; retention of some buildings for interpretive uses, including the Chapman cabin in Society Hill; and use of 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.

4.5.4.2 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 in the winter. These measures would 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 because of the reduced ability for trucks carrying heavy loads to accelerate.

Once implemented, Alternative C would provide a low intensity of reuse for the District, including exterior restoration of cabins in two areas for use as interpretative exhibits. An increase in total daily trips would occur under this alternative, from 1,340 in the No Action Alternative to 2,323 in Alternative C. Internal pedestrian trips would increase from 431 per day in the No Action Alternative to 435 per day in Alternative B, with no change in internal, two-way vehicular trips (Tables 4-7 and 4-8). These changes in trips would be associated primarily with visitors traveling between areas of the District to view exhibits and to use other facilities.

The level of service would not change along District roads, 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

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vehicle and pedestrian conflicts would still exist, these proposed modifications would provide added safety to visitors, a long-term, and moderate indirect benefit compared to the No Action Alternative.

4.5.5 Impacts on Other Resources

4.5.5.1 Viewshed

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*, represented by the No Action Alternative, was implemented.

Long-term, indirect, minor, adverse effects would be created by retention of most of the Daisy Town buildings, the Appalachian Clubhouse, the Chapman cabin on Society Hill, and the Spence Cabin in Millionaire's Row. Although retention of these buildings would adversely affect visual quality by obstructing the natural viewshed, some direct and indirect, 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 E depict the existing views of a variety of contributing structures and simulations of the potential views following removal of these buildings).

Alternative C would 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 would 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 in Appendix E 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 because of retention of some buildings, structures, and cultural landscape components. Composite viewshed areas shown in Figures E-7, E-8, and E-9 in Appendix E 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 would occur during implementation of Alternative C because of construction activities. The noise emissions from combustion-powered equipment, including diesel engine earth moving equipment, would be the primary contributors to the sound levels during construction, and could 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 to 100 A-weighted decibels. The major sources of construction noise in this alternative may include removal of buildings, hauling, grading, and paving. Construction noise would be relatively short in duration and would be

restricted to daytime hours in winter when visitation is lowest. Following project implementation, noise levels under Alternative C would be in the range of 50 to 60 A-weighted decibels.

4.5.6 Impacts on NPS Operations

Alternative C would have direct, short-term, moderate to major, adverse effects on Park operations because of the requirements for funds and staffing to implement the removal of 31 contributing and 24 noncontributing buildings in the Elkmont District. In addition to building removals, Alternative C would include expanding the existing infrastructure, increasing the number of parking lots and paved pathways, restoring 16 historic cabins in Daisy Town and the Chapman cabin in Society Hill for use as interpretive exhibits, and restoring and rehabilitating the Appalachian Clubhouse and Spence cabin for day use. While construction and preservation work was underway, there would be direct, short-term, minor, adverse effects on operations because of staffing and funding requirements to complete the work.

Following removal of the 55 structures, the effect of implementing Alternative C on NPS operations would be indirect, long-term, moderate, and beneficial, primarily because much of the need to stabilize, maintain, and police buildings across the District would be eliminated. Over the long term, the costs associated with preserving and maintaining the remaining buildings and the upgraded infrastructure (for example, cleaning the pervious pavement and maintaining exhibits) would be increased over existing conditions and would result in direct and indirect, long-term, minor, adverse effects on park operations. 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 on NPS operations would result from the removal of the Elkmont buildings and the health and safety hazards they pose to Park staff and visitors. For example, the buildings harbor animals that potentially can serve as vectors for diseases that are fatal to humans, including hanta virus, which is spread by rodents, and histoplasmosis, which is spread by bats and birds. Some of the buildings contain debris, including broken glass, fallen plasterboard, and lead-based paint. Removal of hazards that pose a danger to the visiting public and Park staff would reduce the need for NPS law enforcement in the District and special maintenance precautions, and would provide long-term, moderate benefits to NPS operations.

Some of the expenditures required for vegetation management adjacent to the buildings would be eliminated as buildings were removed, indirectly benefiting NPS operations through a reduction in costs associated with staff time and equipment needs. However, the impact on NPS operations because of the ongoing need for removal of hazard trees adjacent to exhibits, trails, and roads, and other vegetation management throughout the District would be both direct and indirect, would occur over the long term, and would be minor and adverse because most areas of the District and the grounds would be open to the public and would require more aggressive vegetation management. This would result in a greater commitment of operational resources than under existing conditions.

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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.

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 would provide multiple benefits to the aquatic and terrestrial environment through soil stabilization and reductions 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 would help to lower the potential for contaminants to enter the river. At the same time, revegetation of native plant communities would increase 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. Revegetation 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 move into surrounding areas of the Park.

The loss of aboveground cultural resources in Alternative C would result in a long-term, 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 east Tennessee (Thomason *et al.* 1993). When added to past actions, implementation of this alternative would cumulatively result in the loss of groupings of buildings representing this period in southern Appalachian history.

4.5.8 Conclusion

Of the seven alternatives, Alternative C was identified 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 identifying the preferred alternative for this *General Management Plan* amendment and environmental impact statement, the National Park Service employed the “Choosing By Advantages” decision-making process. This process analyzed the advantages of each developed alternative and considered the beneficial impacts as described in this environmental impact statement to quantify and rank total advantages for each alternative. Proposed costs were applied to all ranked alternatives, and a cost-benefit analysis was conducted. The alternative with the most gains or advantages for the associated cost was then identified 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
- 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. The 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 and *General Management Plan* amendment involved both a broad view of the Park and consideration of issues specific to Elkmont, and required a clear evaluation of gains and benefits for each developed alternative. The analysis of alternatives for each factor was based on the 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. The long-term productivity of all biotic resources would be benefited because of 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.

An adverse effect to cultural resources would occur because of removal of 31 contributing buildings and the diminished 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 removal of these 31 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.

While the overall effect is adverse, 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 contributing structures 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's 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* (The Secretary of the Interior 2005) 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

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Alternative C are visitor facilities, land use, and visitor experience. Preservation of 16 cabins and rehabilitation of the Appalachian Clubhouse in Daisy Town, preservation of the Chapman cabin on Society Hill, and rehabilitation of the Spence cabin in Millionaire's Row, 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 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. The alternative proposes as mitigation the preservation of Cabin #42, "River Lodge" or "Spence Cabin" for its association with the former president of the Little River Lumber Company. NPS operations would benefit following implementation of this alternative because of 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 long-term effect to NPS operations of retaining 19 buildings would be minor, but adverse because of 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.

Natural forest regeneration, as described in the *General Management Plan* (NPS 1982b), would be prevented where selected buildings were 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 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

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 established goals or objectives for the District. For instance, where aboveground 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 National Park Service 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 would primarily be 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 air emissions from construction equipment; and the short-term adverse effects on visual quality and aesthetics that would occur during and immediately following construction, before disturbed areas were revegetated.

During construction, air quality and noise levels could be adversely affected by 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 National Park Service to minimize adverse impacts were followed. These effects would be temporary and limited to the construction period and shortly thereafter until vegetation was restored. 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 and Spence cabins.

4.6 IMPACTS OF ALTERNATIVE D

Both options for Alternative D (D1 and D2) would retain 16 cabins and the Appalachian Clubhouse in Daisy Town, the Chapman cabin (#38) in Society Hill, the Spence cabin (#42) in Millionaire's Row, and six cabins in the Wonderland Club. It would remove all other contributing structures 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 would reconstruct the Wonderland Hotel and rehabilitate the Annex. Both would be used for use as a curatorial storage facility.

Visitation to the District following implementation of D1 or D2 would increase by an average of 26 visitors per day, plus a maximum additional 18 visiting scientists per day using the temporary housing (see Table 2-18). The length of an average daily visit and the internal trips within the District would increase because of 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 National Park Service 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 National Park Service already budgets for the roads, parking, water and wastewater systems, and operations and staffing.

4.6.1 Impacts on Cultural Resources

4.6.1.1 Buildings and Cultural Landscape

Implementation of Alternative D would result in direct, long-term, major, adverse effects to the buildings within the Elkmont Historic District, because of removal of 24 contributing buildings under D1 or 22 contributing buildings under D2. This alternative would also result in direct, long-term, moderate adverse effects to the cultural landscape, primarily because of the removal of buildings.

Of the 24 contributing buildings proposed for removal under D1, 22 buildings were listed as "poor" or "fair to poor" condition in a 2003 survey. Of these 22 buildings the Knaffl cabin (#36) has substantial portions that have collapsed, the Wonderland Hotel was removed following a major collapse in August 2005, and at least four other cabins have serious problems with structural integrity. The Wonderland Hotel was documented for the Historic American Building Survey in 2003.

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, the rehabilitation of the clubhouse, and, if D2 is implemented, the reconstruction

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of the Wonderland Hotel would be conducted in accordance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (The Secretary of the Interior 2005).

New elements would be introduced into the District, including an orientation kiosk with exhibits, interior exhibits, eight wayside exhibits, new parking areas, upgraded 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 eroded culverts. Long-term, indirect, minor, adverse effects on District's cultural resources 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 direct, long-term, minor to major, beneficial effects because of 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 was implemented, direct, long-term, major, beneficial effects would also 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 would be conducted in accordance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (The Secretary of the Interior 2005), as would restoration and preservation of the noncontributing Swan cabin (#4) to make it a contributing element. The retention of cultural landscape characteristics and features would constitute a direct, long-term, minor, beneficial effect.

The 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 indirect, long-term, minor, adverse effects on District cultural resources. The proposed new elements would constitute a minimal visual change District-wide, in part because the proposed parking areas, paths, and roads would be located in areas already visually impacted by existing infrastructure.

The proposed electrical lines would be buried in the ground, which would remove intrusive power poles that postdate the period of significance. The burying of utilities would have minimal, if any, effect on the existing topography, spatial organization, or land use patterns of historic district or cultural landscape. Once the underground utility lines were installed and the trenches were backfilled, the disturbed ground would be restored to its preconstruction contour and condition. Any adverse impacts associated with construction during the installation of underground utilities would be short-term and negligible.

The belowground pumping stations would not be visible, except for small access hatches placed flush with the ground surface. The pumping station behind the Wonderland Hotel would have an aboveground electrical control panel about 2 or 3 feet tall, surrounded by a security fence. These 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. This area is visually removed from the District's contributing structures.

The indirect, long-term, minor adverse effects on the District and its landscape caused by the modest increase that would occur from visitor trips to and from the exhibits would not 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.

4.6.1.2 Archeological Resources

The potential for Alternative D to impact archeological resources would depend on the extent and location of ground-disturbing activities. These alternatives propose removal of fewer buildings than the No Action Alternative. However, the 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 and long-term, and could be major.

This alternative also has 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, long-term, 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. These effects could result from the construction of the Little River Trail and Wonderland Hotel parking areas, and installation of water and sewer lines. The impacts to archeological resources because of 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.

4.6.1.3 Section 106 Determinations

Under Section 106 of the National Historic Preservation Act, the removal of 22 to 24 contributing buildings within the National Register of Historic Places-listed Elkmont Historic District would constitute an adverse effect. 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, were not implemented.

All mitigation would be determined through formal consultation with the Tennessee State Historic Preservation Office, the Advisory Council on Historic Preservation, The Chickasaw Nation and The Eastern Band of Cherokee Indians Tribal Historic Preservation Officers, and

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other consulting parties, as appropriate. The exact types and cost of the mitigation cannot be calculated at this time.

4.6.2 Impacts on Natural Resources

Impacts to natural resources because of 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 would remove 49 buildings in Elkmont Historic District (47 if D2 is chosen). As a result, direct, short-term, moderate, adverse effects on soils would occur during project implementation if the use of heavy machinery and other demolition equipment was necessary for removal of the buildings and for the 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 National Park Service to minimize impacts to soils. The adverse effects on soils because of project implementation activities would be temporary.

Additional activities required under Alternative D that would create direct, long-term, moderate, adverse effects include construction of four parking areas under D1 or five parking areas under D2; installation of water, sewer, and electrical lines; expansion of the wastewater treatment plant; road repairs; and minor widening and the installation of paths. All of these activities would 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. As vegetation was reestablished, the erosion rate would decline to preproject levels.

Effects on soils would result from some elimination and some addition of paved or impervious surfaces. About 1.64 acres of impervious surfaces in D1 and 1.17 acres in D2 would be eliminated when the buildings were removed (see Table 4-3). Rates of runoff and soil erosion would decrease in those areas and long-term beneficial effects on soils and adjacent waterways would be provided. Other elements would involve paving 1.5 acres with pervious pavement in D1 and 2.1 acres in D2. In D1, restored ground would be greater than areas covered by pavement providing direct, long-term, minor beneficial effects to soils. In D2, the newly paved area would be greater than the restored ground, and the direct, long-term, minor effects to soils would be adverse. Once vegetation was 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.

Additional incremental adverse impacts from soil compaction and trampling of plants would occur because of a small increase in the estimated number of visitors and a modest increase in internal pedestrian trips (see Table 4-7).

Pervious concrete would be used in parking areas and paths, and some infiltration would occur where this material was used. However, the surface would produce higher rates of runoff than would occur with the No Action Alternative (see Table 4-5). The long-term, indirect, adverse

effects would be minor following implementation of D1, with a 2.2 percent increase in surface water runoff. Surface water runoff would increase by 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 because of contamination of runoff with petrochemicals and other contaminants from automobiles.

4.6.2.2 Biotic Communities

Terrestrial Plant Communities. Retention of buildings throughout the District would require hazard tree removal beyond that which would be required in the No Action Alternative. For historic buildings and grounds that have public access, the National Park Service typically intensely manages the surrounding landscape. 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 and would truncate the age/size distribution by removing old or large trees that are identified as hazards and eliminating much of the old growth stage of development. The effects would be direct, occurring during project implementation, and indirect as a result of continued hazard tree management. The effects would be moderately adverse, and would occur over a larger area in Alternative D than in previously discussed alternatives because more buildings would be retained. Effects would be incrementally greater if D2 was implemented than D1 because of 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 that 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 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 the montane alluvial forest type. Retention of one building, 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 throughout floodplain and wetland areas (see Table 4-3) once the buildings were removed and hazard tree management was no longer necessary in these areas. This would result in direct and indirect, long-term, moderate, beneficial effects.

In Society Hill, forested areas experienced considerable disturbance because of 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,

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southern Appalachian cove, and Virginia pine successional forest communities. These communities would expand and mature with the implementation of Alternative D.

Most of the buildings in the Wonderland Club and Daisy Town would 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 would occur during construction. During construction, excavation for electrical, 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 provide access to it and the Annex would require ground disturbance for installation of electrical, 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 the resulting garbage, would attract wildlife, increasing the potential for human/wildlife encounters. Encounters with black bears, raccoons, and even rodents can be dangerous for both the humans and animals involved. Increased traffic would also increase the potential for vehicular collisions with wildlife. These impacts on wildlife would be minor because they would affect individuals and not entire populations.

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 because of 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 National Park Service to minimize the potential for adverse effects to biotic communities (see Section 2.10). Even with incorporation of these measures, the work may result in unavoidable, yet negligible discharges of sediment into aquatic environments.

The 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 would result in trampling of vegetation and loss of soil stability. Increased traffic and parking would result in deposition of petrochemicals, which, when mixed with rainfall runoff, can contaminate 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, because none are known to occur within the proposed project implementation area. A state-listed

threatened species, butternut, and two state special concern species, Fraser's sedge and chamomile grapefern, occur within the District. Because many of the buildings would be retained under Alternative D and visitation would increase following project implementation, there would be only small increases in suitable habitat for threatened, endangered, rare, and sensitive species, resulting in indirect, long-term, negligible, beneficial effects. The increased visitation expected would 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 because of 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 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 exists 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 would be negligible. Following project implementation, expansion of the available area for infiltration should provide long-term, negligible, beneficial effects to water quality under D1, indirectly affecting downstream species such as the hellbender. Under D2, because of a decrease in area available for infiltration, these same effects would be minor and adverse.

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 encroach on 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. 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

If heavy equipment was used in wetlands within Millionaire's Row, short-term, direct, minor adverse effects to wetlands would occur during project implementation as a result of disturbance created by these machines. The environment of the wetlands along Bearwallow Branch is not suitable for machine traffic or heavy pedestrian traffic because of saturated soil conditions.

Although these wetlands may be disturbed during project implementation, 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 adjacent buildings within Millionaire's Row. Wetlands adjacent to proposed parking areas are subject to runoff and deposition of petrochemicals creating indirect, long-term, negligible adverse effects.

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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 enhance the wildlife habitat function by providing additional upland habitat and by increasing plant diversity. Wildlife species that migrate into areas that were formerly occupied by buildings would also be able to use nearby wetland habitat.
- The aesthetic/visual quality value of wetlands 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.
- The water quality and, subsequently, the fish and shellfish habitat functions would improve because of 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*

Surface Water Runoff. Implementation of Alternative D could potentially affect water quality because of 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. Because the Little River is listed as an Outstanding National Resource Water, any adverse effect could create considerable impacts. Potential impacts to water quality resulting from implementation of Alternative D are described below.

Indirect, short-term, negligible, adverse effects to water quality could occur during construction as additional ground disturbance occurred during removal of the buildings and installation of electrical, water, and wastewater lines. Although best management practices would be followed, there would still be a potential for increased erosion and resulting sedimentation into water bodies.

Following construction, indirect, long-term, negligible, beneficial effects would result from implementing D1 because of a total increase in area available for infiltration that would equal 0.14 acres (because more impervious surfaces would be removed than would be added). If D2 was implemented, the indirect, long-term effects to water quality would be adverse and minor because there would be a net increase in impervious surfaces of 0.93 acres.

Indirect, long-term, adverse effects would be minor under D1 and moderate under D2 as a result of increased run-off from newly paved parking areas. See Table 4-5.

Sewage Treatment and Pollutant Discharge. Alternative D would include rehabilitation of the Appalachian Club interior for day use, which would require 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 times each day. This would be resolved by the construction of a flow equalization basin at the head of the plant that would store influent from the peaks and release it into the plant at a constant rate. This is the only improvement to the wastewater treatment plant that would be 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 4-4).

There are not any baseline conditions established for thermal loading, other than typical wastewater temperatures of 60° Fahrenheit (see Section 3.2.4.4). However, the incremental increase in effluent discharged in this alternative would result in negligible temperature effects in the Little River. The effluent discharge *rate* would remain the same as the existing condition (40 gallons per minute) under all alternatives. At the current rate of discharge, thermal impacts are dissipated entirely within 3 feet of the discharge pipe. Because 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. 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 in-stream impacts to both Jakes Creek and the Little River.

Other wastewater components required under Alternative D would include additional gravity sewer lines, low-pressure sewer force mains, a 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 was reestablished in those areas, the potential for erosion and sedimentation from the ground disturbance would be reduced or eliminated. Therefore, there would be negligible long-term effects on water quality as a result of installing these wastewater treatment components.

4.6.2.6 Floodplains

There would be negligible, direct, adverse effects to the 100-year floodplain of the Little River or its tributaries as a result of implementing Alternative D. Long-term, direct and indirect, moderate, beneficial effects to the 100-year floodplain would be achieved through removal of any impervious surfaces currently in and adjacent to the floodplains of Jakes Creek, Bearwallow Branch, and the Little River. An increase in the area available for infiltration and flood storage would be a direct benefit from removal of five buildings in the 100-year floodplain. These buildings include Burdette (#16), Miller (#46), Faust (#47), Faust garage (#47A), and Young (#48). Along-term, moderate, direct beneficial effect would be an increase in the area for recovery of associated floodplain plant communities, such as the montane alluvial forest, that is expected to regenerate at former building sites. Restricting vehicular access and removing buildings in areas adjacent to floodplains would provide direct and indirect, long-term, minor benefits by increasing the area available for infiltration, thereby reducing the demand for flood storage within the floodplains. Additional indirect, long-term, minor benefits would be achieved because removal of

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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 because of 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 performing construction during the time of year when ozone is least likely to form (October to March).

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

Visitation and internal vehicular trips would rise under Alternative D (see Table 4-7 and Table 4-8). As described in Section 4.4.2.7, an analysis was performed to evaluate the potential nitrogen deposition and nitrogen dioxide impacts from these uses. The results of an analysis showed 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 (1×10^{-4}) of the nitrogen deposition threshold.
- The visible haze analysis indicated no visible haze impacts.
- The maximum impact of nitrogen dioxide to the annual nitrogen dioxide Class I Prevention of Significant Deterioration increment was approximately 0.017 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$), or one-sixth of the U.S. Environmental Protection Agency's Class I significance level of 0.1 micrograms per cubic meter.

A visible plume analysis was performed using the U.S. Environmental Protection Agency's VISCREEN model in the Level 1 mode. The results indicated that there will not be a visible plume impact from the vehicle emissions.

In an air quality assessment based on a busy Saturday in the summer, the year 2015 air emissions that would result from Alternative D would result in a 2.92-tons-per-year increase of nitrogen oxide emissions and a 4.01-tons-per-year increase in volatile organic compound emissions, compared to the No Action Alternative (Table 4-6). This increases in emissions for each of these pollutants would be less than 5 tons per year over the existing condition (see the threshold definitions in Table 4-1), 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

Alternative D would create both beneficial and adverse effects on the visitor experience within the District.

For those visitors who see the buildings as detracting from the natural environment, Alternative D would create direct and indirect, long-term, minor, beneficial effects. These would result from the removal of 24 contributing buildings under D1 or 22 contributing buildings under D2, and 24 non-contributing buildings under both. For this same group, the retention of 25 contributing buildings under D1 or 27 under D2, and one non-contributing building under both, would create direct and indirect, long-term, moderate, adverse effects to the visitor experience.

For visitors who see the contributing structures as an important visual and cultural asset, this alternative would have direct and indirect, long-term, moderate, adverse effects on their experience because of removal of buildings in most of Millionaire's Row and Society Hill. For those who want buildings retained, this alternative would create direct and indirect, long-term, moderate, beneficial effects because of the retention of one non-contributing building and 25 contributing buildings under D1 or 27 under D2.

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 cabin (#38) would be restored in Society Hill and a wayside exhibit would be 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 would be installed. Wonderland Club cabins and the Wonderland Hotel and Annex under D2 as the Park curatorial facility would be restored or reconstructed. The addition of wayside exhibits, interior exhibits, updating of the trail brochure, and an exhibit in Millionaire's Row discussing the natural history of synchronous fireflies would also be added.

Visitor experience would change considerably as a result of implementing Alternative D. Although removal of some of the buildings and restoration and preservation of others would not substantially 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 the 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 were viewing in the District and to associate a sense of time and place with the buildings. These types of interpretive materials are not currently available in the District and their installation would provide long-term, moderate to major benefits to the visitor experience.

In addition to these interpretive efforts, the general public would 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.

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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.

Alternative D would have indirect, long-term, minor, adverse effects under D1 and moderate adverse effects under D2 on the visitor experience because an increase in visitation and visitor activities would create additional congestion within the District. Noise and other disruptions associated with construction activities in the District would introduce direct, short-term, negligible to minor, adverse impacts on visitor use and experience. These impacts would last only as long as the construction.

4.6.3.2 Visitor Facilities

Visitors would experience long-term, direct and indirect, moderate benefits as a result of increased facilities that would be associated with Alternative D. Although 22 or 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 would interpret the cultural resources. With the addition of the exhibits and the reconstructed Wonderland Hotel (in 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, and the establishment of the Park and how it affected Elkmont. They also would be able 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 entered the District and most of the major sections of the District, including the campground.

Additional benefits would be provided by the construction or repaving of up to five parking areas in the District, repaving roads, and resurfacing or creating 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

4.6.4.1 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 *General Management Plan* (NPS 1982b). Implementation of Alternative D would continue to allow for use of public road

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 use of 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 would increase, as would overall visitation to the District (see Tables 4-7 and 4-8). However, increased visitor opportunities within the District would not be expected to result in land use conflicts such as traffic congestion or crowding if Alternative D was implemented.

4.6.4.2 Access and Circulation

Alternative D would provide a moderate intensity of use, 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 in the winter. These measures would 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 because of the reduced ability for trucks carrying heavy loads to accelerate.

An increase in visitation would 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 (Table 4-7). Internal daily pedestrian trips would increase from 431 to 447 in D1 and 479 in D2 (Table 4-8). Compared to the No Action Alternative, the estimated change in volume of external trips along Elkmont Historic District roads is 1,112 additional trips under D1 or 1,245 additional trips if D2 is implemented. To alleviate potential conflicts between vehicles and pedestrians, Alternative D would include resurfacing an overgrown pathway in Daisy Town and relocating a gate on Jakes Creek Road to just south of the intersection with Jakes Creek Cemetery Road. These modifications would provide added safety to visitors, which would be a direct and indirect, long-term, beneficial effect.

Despite the road and access modifications that would be included in this alternative, the level of service in some areas would be reduced from A to B. This change in level of service 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 effects on access and circulation.

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4.6.5 Impacts on Other Resources

4.6.5.1 Viewshed

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*, represented by the No Action Alternative, was implemented.

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 direct and indirect, 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 E depict the existing views of a variety of contributing structures and simulations of the potential views following removal of these buildings). Alternative D also would retain foundations, rock walls, and other cultural landscape components that would pose a minor obstruction to views of the District's natural resources.

Direct, adverse impacts to visual quality and aesthetics would 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 E) 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 because of retention of some buildings, structures, and cultural landscape components. Composite viewshed areas shown in Figures E-7, E-8, and E-9 in Appendix E 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 would occur during implementation of Alternative D because of construction activities.

The noise emissions from combustion-powered equipment, including diesel engine earth moving equipment, would be the primary contributors to the sound levels during construction, and could 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 to 100 A-weighted decibels. The major sources of construction noise in this alternative may include removal of buildings, hauling, grading, paving, and restoration and rehabilitation of buildings and construction of new facilities. Construction noise would be relatively short in duration and would be restricted to daytime hours in winter when visitation is lowest. Following implementation of

Alternative D, noise levels would remain in the average range of 50 to 60 A-weighted decibels, with maximum levels (over short periods of time) exceeding 70 A-weighted decibels for loud vehicles.

4.6.6 Impacts on NPS Operations

Alternative D would have direct, short-term, moderate, adverse effects on park operations because of the requirements for funds and staffing to

- remove 22 to 24 contributing and 24 noncontributing buildings
- upgrade and expand the infrastructure
- construct or upgrade parking lots, roads, and paths
- restore 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
- reconstruct the Wonderland Hotel and rehabilitate the hotel annex for use as a curatorial storage facility (D2 only)

For D1, this work would have direct, short-term, minor to moderate, adverse effects on park operations. D2 would have direct, short-term, moderate to major, adverse effects on operations because of staffing and funding requirements.

The long-term effect on park operations of removing 46 to 48 buildings from the site would be indirect, long-term, moderate, and beneficial, primarily because the need to stabilize, maintain, and police buildings across the District would be largely eliminated.

All of the new or upgraded visitor facilities, exhibits, and infrastructure would have to be maintained by NPS staff. There would be both direct and indirect costs associated with the long-term preservation of the remaining buildings and for maintaining the upgraded infrastructure, such as cleaning the pervious pavement and maintaining exhibits. These would be direct and indirect, long-term, minor, adverse effects.

Additional funding and personnel would be required under D2 to operate the Wonderland curatorial storage facility. Also, 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 would change substantially to the extent that housing and funding for a ranger (level GS-9) would be required to police the exhibits and curatorial facilities. All of these additional costs associated with the curatorial facility would result in moderate, adverse effects on operations.

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. The cost of the new, in-park facility would be somewhat offset by no longer having to pay for offsite curatorial storage.

Cultural resources would benefit by providing storage that meets museum collections and artifact storage standards. This would result in long-term, moderate beneficial effects to park operations.

Some expenditures required for vegetation management adjacent to the buildings would be eliminated as buildings were removed, indirectly creating a long-term, moderate, benefit for NPS

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operations through a reduction in costs associated with staff time and equipment needs. However, the overall indirect effect on NPS operations because of hazard tree and other vegetation management would 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 were removed, the National Park Service would have to manage vegetation to provide for visitor safety. This would include removing hazard trees adjacent to exhibits, trails, and roads to reduce the risk that visitors could be harmed by falling trees.

4.6.7 Cumulative Effects

The loss of aboveground cultural resources in Alternative D would result in a long-term, 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 of this type and time period in east Tennessee (Thomason *et al.* 1993). When added to past actions, implementation of this alternative would cumulatively result in the 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 would provide 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 would adversely affect air quality. The effect of increases in nitrogen oxide and volatile organic compound emissions resulting from implementation of Alternative D would be very small 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 exacerbated by increased disturbance caused by pedestrian traffic into sensitive areas. Revegetation 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 spread into surrounding areas of the Park.

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 D1, the long-term productivity of biotic resources would benefit because of the increase in land available for restoration of native plant communities. This effect would be lower in D2 because of elimination of the 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.

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 because of 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 long-term effect to NPS operations would be moderately adverse because of 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.

Irretrievable commitments of resources would result if Alternative D was implemented. These would be created primarily by removal of almost half of the contributing buildings and would constitute a direct, long-term, 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) because of increased internal trips to view exhibits.

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

While the overall effect would be adverse, cultural resources would be enhanced as direct, long-term, minor to major beneficial effects would result by retaining, restoring, and preserving some contributing structures, including the Appalachian Clubhouse, 16 Daisy Town cabins, the Spence (#42) and Chapman (#38) cabins, six cabins in the Wonderland Club, and 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 of the Interior’s Standards for the Treatment of Historic Properties* (The Secretary of the Interior 2005) would create a beneficial effect, as would the restoration and preservation of the Swan

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noncontributing cabin (#4) to make it a 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 all would be beneficial effects. Other areas that would benefit from Alternative D would include visitor facilities and visitor experience.

Some unavoidable adverse impacts associated with implementing Alternative D would be 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, buried power 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, before vegetation was establishment 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 would retain 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, and seven cabins in the Wonderland Club. It would removal of all other contributing structures 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 would reconstruct the Wonderland Hotel and rehabilitation of the Annex for public lodging and dining.

Day-use visitation as a result of implementing Alternative E would increase by an average of 26 visitors per day (see Table 2-18), plus up to 22 visiting scientists and 57 guests using overnight lodging in E1 or 109 guests for E2. The length of an average daily visit is also expected to increase because of 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 would be installed and the Elkmont Nature Trail brochure would be updated to include natural and cultural information on Elkmont. The National Park Service 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 major increase in operation and maintenance expenditures would be required beyond what the National Park Service already budgets for the roads, parking, water and wastewater systems, and operations and staffing.

4.7.1 Impacts on Cultural Resources

4.7.1.1 Buildings and Cultural Landscape

Implementation of Alternative E would result in direct, long-term, moderate, adverse effects to the buildings within the Elkmont Historic District, because of 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, and a reconstructed Wonderland Hotel and a restored/rehabilitated Annex could be used for lodging if E2 was chosen. The majority of Elkmont's cultural landscape features and the 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 a 2003 survey. Of these 17, Cabin #36 has substantial portions that have collapsed, the Wonderland Hotel was removed following a major collapse in August 2005, and at least three other cabins have serious problems with structural integrity. The Wonderland Hotel was documented for the Historic American Building Survey in 2003.

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

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under this alternative as would other eligible cultural landscape features. The preservation of the retained cabins, the rehabilitation of the clubhouse, and, if E2 was implemented, the reconstruction of the Wonderland Hotel would be conducted in accordance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (The Secretary of the Interior 2005). While many cultural landscape features would be retained under this alternative, direct, long-term, moderate adverse effects to the cultural landscape would occur because of the removal of 19 contributing buildings.

New visual elements would be introduced into the District. These would include an orientation kiosk, ten wayside exhibits, four parking areas (six if E2 is chosen), paths and roads, a replacement bridge (if E2 is chosen), pumping station access hatches, an electrical control panel, a well house, a flow equalization basin, and 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).

Direct, long-term, minor to major, beneficial effects would include retention of the Appalachian Clubhouse as a public day use rental facility and self-guiding museum, 16 Daisy Town cabins, the Chapman cabin (#38), six cabins and one garage on Millionaire's Row, and the seven Wonderland cabins. If E2 was chosen, these beneficial effects also would extend to the reconstruction of the Wonderland Hotel (as a contemporary re-creation of the original building) and restoration and rehabilitation of the Annex.

Retention of most of the District's cultural landscape characteristics and features would result in direct, long-term, minor, beneficial effects. Restoration, rehabilitation, preservation, and reconstruction of the retained buildings would be conducted in accordance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (The Secretary of the Interior 2005) as would the restoration of the Swan noncontributing cabin (#4) to a point within the period of significance based on available documentation.

The interpretive exhibits, parking areas, new paths and roads, 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. Effects would be reduced by locating these features in areas already visually impacted by existing roads, paths, parking areas, and a noncontributing bridge.

The proposed electrical lines would be buried in the ground, which would remove intrusive power poles that postdate the period of significance. The burying of utilities would have minimal, if any, effect on the existing topography, spatial organization, or land use patterns of the historic district or cultural landscape. Once the underground utility lines were installed and the trenches were backfilled, the disturbed ground would be restored to its pre-construction contour and condition. Any adverse impacts associated with construction during the installation of underground utilities would be short-term and negligible.

The belowground pumping stations would not be visible, except for small access hatches placed flush with the ground surface. The pumping station behind the Wonderland Hotel would have an

aboveground electrical control panel about 2 or 3 tall, surrounded by a security fence. These minor elements would be designed to be as unobtrusive as possible. The well house would be small and located away from the District buildings in an area where it could be screened. The 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, would result in a moderate adverse effect, because of the numbers of visitors and vehicles projected and the more intensive use proposed for many of the buildings and features slated for retention.

4.7.1.2 Archeological Resources

The potential for Alternative E to impact archeological resources would depend on the extent and location of ground-disturbing activities. This alternative would remove 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, long-term, 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, long-term, and 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 would include three additional loci where potentially significant resources have been identified. Resources at these loci could be adversely affected by installation of the Little River Trail and Wonderland Hotel parking areas, and installation of sewer and water lines. The impacts to archeological resources because of 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.

4.7.1.3 Section 106 Determinations

Under Section 106 of the National Historic Preservation Act, the removal of 17 to 19 contributing buildings within the National Register of Historic Places-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 would be determined through formal consultation with the Tennessee State Historic Preservation Office, the Advisory Council on Historic Preservation, The Chickasaw

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Nation, The Eastern Band of Cherokee Indians Tribal Historic Preservation Officers, and other consulting parties, as appropriate. The exact types and cost of the mitigation cannot be calculated at this time.

4.7.2 Impacts on Natural Resources

Impacts to natural resources because of implementation of Alternative E would result primarily from the greater development, intensity of use, and increased activities within the District. Direct impacts to natural resources would result from ground-disturbing activities associated with building removal and infrastructure modifications. Indirect 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 would remove 42 buildings within the District (40 if E2 was chosen). Direct, short-term, moderate adverse effects on soils would occur during project implementation if the use of heavy machinery and other equipment was necessary for the removal of the buildings and for the installation of new water, sewer, and underground electrical lines; road repair; and construction of an equalization basin and 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 National Park Service to minimize impacts to soils, and the adverse effects on soils because of project implementation activities would be temporary.

Additional activities required under Alternative E would create direct, long-term, moderate, adverse effects under E1 and major adverse effects under E2 to soils. Activities would include construction of four parking areas under E1 or six parking areas under E2; expansion of the wastewater treatment plant; road repairs and minor widening; installation of paths; and, under E2, the installation of a new bridge across the Little River. 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. At all of these sites, as vegetation was reestablished, the erosion rate would decline and adverse effects on soils would be diminished.

The new bridge construction across the Little River is of particular concern because of the presence of flowing water. Although best management practices would be followed to minimize adverse effects, any construction within the stream channel would likely cause a temporary increase in erosion and sedimentation into the river.

Effects on soils would result from some elimination and some addition of paved or impervious surfaces. About 1.44 acres of impervious surfaces in E1 and 0.97 acres in E2 would be eliminated when the buildings were removed (see Table 4-3). Rates of runoff and soil erosion would decrease in those areas and long-term beneficial effects on soils and adjacent waterways would be provided. Other elements would involve paving 1.5 acres with pervious pavement in E1 and 3.0 acres in E2. In both of these options, the newly paved area would be greater than the restored ground, and the direct, long-term, effects to soils would be adverse. The intensity would be negligible for E1 and major for E2. Once vegetation was 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.

Both Alternative E options would increase the number of visitors and the number of internal pedestrian trips (see Table 4-7 and Table 4-8). Additional adverse impacts would occur because of soil compaction and related impacts to plants from trampling.

Pervious concrete would be used in parking areas and paths, and some infiltration would occur where this material was used. However, the surface would produce higher rates of runoff than would occur with the No Action Alternative (see Table 4-5). The increases would be 5.6 percent with E1 and 6.9 percent under E2, and would result in indirect, long-term, major adverse effects on soils because it would result in additional soil erosion and subsequent sedimentation of surface waters.

4.7.2.2 Biotic Communities

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 “globally imperiled” Southern Appalachian montane alluvial forest habitat. Retention of buildings throughout the District would require hazard tree removal beyond that which would be conducted in the No Action Alternative adjacent to trails and within the Elkmont Campground. This activity, in addition to the physical presence of buildings and the associated infrastructure, would severely disrupt plant community dynamics within the District.

Initial vegetation management would be aggressive adjacent to retained buildings. 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 substantial amount of vegetation management, including hazard tree removal, would be required at each building, and along paths and at exhibits and trailheads.

These direct adverse impacts would be long-term and major, and would occur over a large area because of the wide distribution of the buildings that would be retained. Adverse effects would be incrementally greater if E2 was implemented because of retention of the Wonderland Hotel and Annex. Increased pedestrian and vehicular traffic would also create long-term, indirect, major, adverse, impacts on biotic communities because of trampling of vegetation and disturbance of wildlife.

In Millionaire’s Row, Daisy Town, and the Wonderland Club, the majority of the buildings would 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 Millionaire’s Row would preclude the opportunity for reestablishment of the globally imperiled montane alluvial forest.

Removal of the buildings in Society Hill would allow a variety of plant community types to increase. In Society Hill, forested areas have experienced considerable disturbance because of 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

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of the buildings would allow for expansion of these communities and succession to hardwood forest.

Short-term, moderate, direct, adverse effects to biotic communities would occur during construction. During construction, excavation would disturb vegetation and 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 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 expand in areas where buildings were removed, the area available would be relatively small and the habitat may not be suitable for species that cannot tolerate the presence of humans and their vehicles. Visitation would increase as compared to the No Action Alternative and the higher visitation would be accompanied by a proportional increase in the improper storage and disposal of food. Food brought into day use areas and the resulting garbage would attract wildlife, increasing the potential for human/wildlife encounters. Interactions with black bears, raccoons, and even rodents can be dangerous for both the humans and animals involved. Increased traffic would also increase the potential for vehicular collisions with wildlife. These indirect, adverse effects on wildlife would be minor because they would affect individuals and not entire populations.

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 because of 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 would result in temporary disturbance within and adjacent to the floodplain of the Little River. Protocols for impact avoidance measures have been developed by the National Park Service to minimize the potential for adverse effects to biotic communities (see Section 2.10). Even with incorporation of these measures, the work may result in unavoidable, yet negligible discharges of sediment into aquatic environments.

The 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 would result in trampling of vegetation and loss of soil stability. Increased traffic and parking would increase the deposition of petrochemicals that, when mixed with rainfall runoff, could contaminate nearby 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, because none are known to occur within the proposed project implementation area. A state-listed threatened species, butternut, and two state special concern species, Fraser's sedge and chamomile grapefern, occur within the District. Because many of the buildings would be retained under Alternative E, and visitation would increase following project implementation, no increases in suitable habitat for threatened, endangered, rare, and sensitive species would occur. Because of the increased visitation to the area, the potential for trampling of herbaceous vegetation by

pedestrians would 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 National Park Service for that reason.

The hellbender 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 exists 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 would 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. However, retention of most of the buildings, except those in Society Hill, would preclude the long-term maintenance of the grassy habitat that is favored by the firefly. Increased visitation and use could potentially result in long-term, moderate, adverse effects on synchronous firefly populations in the District as more grassy areas were trampled by pedestrians.

The long-term, indirect effects on threatened, endangered, rare, and sensitive species would be moderately adverse because of impacts on existing and potential habitat.

4.7.2.4 Wetlands

If heavy equipment was used in wetlands within Millionaire’s Row, short-term, direct, minor, adverse effects to wetlands would occur during project implementation as a result of disturbance created by these machines. The environment of the wetlands along Bearwallow Branch is not suitable for machine traffic or heavy pedestrian traffic because of saturated soil conditions.

Installation of sewer, water, and electrical lines, and additional infrastructure required to support the retained buildings would require minor excavation and grading. Wetlands along Bearwallow Branch would be especially susceptible to the adverse effects of installing these infrastructure components.

Wetlands may also experience long-term, minor, indirect, adverse effects from the retention and use of nearby buildings, such as those in Millionaire’s Row. The environment surrounding adjacent 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 often produce loss of native plant diversity and subsequent degradation of wildlife habitat.

Several wetland functions and values would be 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.

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4.7.2.5 *Water Quality*

Surface Water Runoff. Alternative E would result in changes to surface water runoff rates and volumes, and would discharge additional treated effluent into the Little River. Because the Little River is listed as an Outstanding National Resource Water, any adverse effect could create considerable impacts. Water quality impacts that would result from implementation of these alternatives are described below.

Alternative E would intensively use buildings across most of the District, except in Society Hill. During the project implementation period, many areas would experience ground disturbance because of 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, sedimentation could still occur, resulting in indirect, short-term, minor, adverse effects to water quality. Once the areas were planted and native vegetation was established, these effects would be reduced.

As described under soils, increases in areas covered by impervious surfaces or pavement would increase compared to the No Action Alternative. This would produce a 5.6 percent increase in runoff in E1 and a 6.9 percent increase in E2 (Table 4-5). The indirect, long-term, adverse effects on water quality from the increased runoff would be moderate for E1 and major for E2.

Sewage Treatment and Pollutant Discharge. Elements of Alternative E that would require increased wastewater management compared to the No Action Alternative include

- rehabilitation of the Appalachian Club interior for public day use rental and for use as a museum, which would require public restrooms
- rehabilitation of some of the cabins in the Millionaire's Row area for visiting scientist temporary housing
- rehabilitation of some of the cabins in the Wonderland Club for public lodging
- in E2 only, reconstruction of the Wonderland Hotel and Annex for lodging

The additional wastewater treatment capacity for improvements necessary under E1 and E2 is estimated at 5,888 and 14,375 gallons per day, respectively (Table 2-18).

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 store the peaks in the daily flow and release it into the plant at a constant rate. This is the only improvement to the wastewater treatment plant that would be necessary to support E1. Increases of wastewater flows into the treatment facility would be detectable, but would not exceed the permitted discharge volume of 35,000 gallons per day and would cause indirect, long-term, minor, adverse effects on water quality.

The additional daily flows for E2 would cause the total projected peak flow to exceed the current capacity of the wastewater treatment plant during many days of the busy summer season. 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 be in direct violation of these regulations, creating an indirect, long-term, major, adverse effect on water resources.

There are not any baseline conditions established for thermal loading, other than typical wastewater temperatures of 60° Fahrenheit (see Section 3.2.4.4). However, the incremental increase in effluent discharged in this alternative would result in negligible temperature effects in the Little River. The effluent discharge *rate* would remain the same as the existing condition (40 gallons per minute) under all alternatives. At the current rate of discharge, thermal impacts are dissipated entirely within 3 feet of the discharge pipe. Because 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. 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 the thermal properties of water quality through discharge of additional wastewater.

Wastewater components required under E1 would 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 pipelines would be installed in areas along roadsides that have already been disturbed. When vegetation was reestablished in those areas, the potential for erosion and sedimentation from the ground disturbance would be eliminated.

To cross streams, pipelines would be suspended under bridges rather than placed under the streambed. If lines could not 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 because of 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 would 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. This would result in direct and indirect, long-term, moderate, adverse effects to the floodplain. Use of these three buildings, Miller (#46), Faust (#47), and Faust garage (#47A), that lie within the 100-year floodplain would also be contrary to NPS policy that expressly prohibits development within floodplains and would, therefore, require a formal statement of findings if this alternative was implemented. According to Director's Order #77-2, the National Park Service 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 were installed. Of particular concern are the Spivey soils adjacent to Bearwallow Branch, which 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 stream bank and reestablish vegetation would be required if Alternative E was implemented. In

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addition, work to restore and rehabilitate buildings in Millionaire's Row would eliminate the possibility of additional regeneration of the montane alluvial forest.

Implementation of Alternative E would indirectly create long-term, minor, adverse effects on floodplains by increasing the amount of impervious surfaces and the erosion potential throughout most areas of the District. The parking areas, road improvements, and soil disturbances 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 stabilize the soil and facilitate precipitation infiltration. This effect would be most evident in Millionaire's Row, which was constructed within and adjacent to the floodplain of the Little River and Bearwallow Branch. If the cabins retained in this area were utilized for temporary housing, disturbance would occur both during and following project implementation in the form of heavy equipment, and vehicular and pedestrian access.

Two buildings that are located within the 100-year floodplain would be removed, including Burdette (#16) and Young (#48). Their removal would result in direct and indirect, long-term, negligible, beneficial effects to floodplain functions.

4.7.2.7 *Air Quality*

As in the No Action Alternative, there would be a temporary increase in emissions under Alternative E because of 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 was in good operating condition, and performing construction from October to March when ozone is least likely to form.

Visitation to the District would increase following implementation of Alternative E. Air emissions would increase from increases in vehicular traffic and by how this traffic moved throughout the District. Increased engine idling times would generally occur as traffic congestion caused increases in travel time along roads, within parking areas, at gates, and at destination points that were visible from the road, such as at wayside exhibits. As a result, projected increases in visitation would be accompanied by a lower level of service on roads servicing the District and more air emissions.

Visitation and internal vehicular trips would rise under Alternative D (see Table 4-7 and Table 4-8). As described in Section 4.4.2.7, an analysis was performed to evaluate the potential nitrogen deposition and nitrogen dioxide impacts from these uses. The results of an analysis showed impacts very far below the nitrogen deposition threshold of 0.01 kilograms per hectare per year.

In an air quality assessment based on a busy Saturday in the summer, the year 2015 air emissions that would result from Alternative E would result in a 6.57-tons-per-year increase of nitrogen oxide emissions and a 9.49-tons-per-year increase in volatile organic compound emissions, compared to the No Action Alternative (Table 4-6). Under Alternative E, the increases in emissions for each of these pollutants would exceed 5 tons per year over the existing condition (see the threshold definitions in Table 4-1), resulting in indirect, long-term, major, adverse effects on air quality.

4.7.3 Impacts on Interpretation and Visitor Use

4.7.3.1 Visitor Experience

Visitor experience would change considerably as a result of implementing Alternative E. Adverse effects on visitor experience during project implementation would be created by increased traffic, noise, and dust, and potentially by delays in circulation caused by movement of construction equipment. These effects would be adverse, direct, negligible to minor, and short-term.

The long-term, direct and indirect effects on visitor experience following project implementation would be both beneficial and adverse. Additional historical information would be available from the Elkmont Nature Trail brochure, exhibits installed inside the Appalachian Clubhouse and Spence (#42) cabin, the orientation kiosk, and up to 10 wayside exhibits. This would have long-term, direct and indirect, moderate to major, beneficial effects under E1 and major beneficial effects under E2.

For visitors who see the contributing structures as an important visual and cultural asset, the restoration and rehabilitation of 32 contributing buildings under E1 and 34 contributing buildings under E2 would create direct and indirect, long-term, moderate to major, beneficial effects. They also would perceive direct and indirect, long-term, minor, adverse effects as a result of removing 17 contributing buildings under E1 and 15 contributing buildings under E2.

Alternative E would create direct and indirect, long-term, moderate to major, adverse effects for those visitors who see the buildings as detracting from the natural environment. For this group, the beneficial effects from removing 17 contributing buildings under E1 and 15 contributing buildings under E2 would be long-term and negligible to minor.

Public lodging would be provided in Alternative E. The Wonderland Club cabins are proposed for public lodging in both options of Alternative E. In addition, 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.

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 cabin (#38) would be restored in Society Hill, allowing visitors to learn about Colonel Chapman's role in the establishment of the Park. Because most of the Society Hill buildings would be removed and native vegetation would be restored, visitors would also have an opportunity to view natural communities.

Visitor experience would have direct and indirect moderate to major, adverse impacts under Alternative E1 and major impacts under E2, primarily because of 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 because of pedestrian and vehicular traffic, diminished air quality, and a change in noise throughout the District. Although noise levels are not expected to

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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

There would be long-term, moderate to major, direct and indirect benefits to visitor facilities as a result of implementing Alternative E. Most of the contributing structures 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 provide visitors with information on the natural environment and would 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 entered the District and most of the major sections of the District, including the campground.

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 maintaining 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 and cabin guests would have the option of dining at the hotel. 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 National Park Service would first be required to examine whether this was 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 to reconstruct the hotel would have to follow Department of Interior guidelines. Both management policies reiterate that reconstruction can only occur with specific, written approval by the Director after a policy review at the Washington office level. If reconstruction was chosen, it would have to be undertaken in accordance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (The Secretary of the Interior 2005), and the building would retain its status as contributing to the District, even though it would not retain the historic integrity of its fabric or its authenticity (NPS 2006).

4.7.4 Impacts on Socioeconomic Environment

4.7.4.1 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, retaining a large number of buildings for public lodging and providing a variety of additional opportunities for those uses described in the land use zone designations in the *General Management Plan* (NPS 1982b) that would result in an increase in the visitation to the District and the internal trips within the District (see Table 4-7 and Table 4-8). Implementation of Alternative E would continue to allow for use of public road corridors, accommodations at the existing Park quarters, and picnicking and camping at the Elkmont Campground.

Historical and natural resource interpretation would increase over that which would be offered by the No Action Alternative through installation of a variety of exhibits, retention of some buildings for interpretive uses, and use of 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 was implemented, at the Wonderland Hotel and Annex. Visiting scientist housing would 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 would result in land use conflicts, including degradation of air quality, visual and aesthetic impacts, traffic congestion, and crowding.

4.7.4.2 Access and Circulation

During implementation, Alternative E 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. These measures would reduce the potential for short-term, 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 because of the reduced ability for trucks carrying heavy loads to accelerate.

Alternative E would create indirect, long-term, major, adverse effects on traffic and circulation within the District under E2 and indirect, long-term, moderate, adverse effects under E1. Alternative E would include 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 was chosen). Because of the high level of redevelopment, this alternative would have substantial potential for traffic problems. Compared to the No Action Alternative, the estimated change in volume of trips along Elkmont Historic District roads would be 1,050 additional trips per day under E1 or 1,467 additional trips per day if E2 was implemented (Table 4-7).

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To alleviate potential conflicts between vehicles and pedestrians, a number of road modifications would be made. However, even with the proposed modifications, the level of service in some areas would be reduced (from A to B if E1 was selected and from A to C if E2 was 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, and level F describing a condition in which traffic delays can be severe.

4.7.5 Impacts on Other Resources

4.7.5.1 Viewshed

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*, represented by the No Action Alternative, was implemented.

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 direct and indirect, 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 E depict the existing views of a variety of contributing structures and simulations of the potential views following removal of these buildings). Installation of new infrastructure components required to implement these alternatives, including parking areas, paths, and electrical, sewer, and water supply components, would further impact the natural viewshed.

Direct, adverse impacts to the District viewshed would occur during implementation of Alternative E 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 E) 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 because of retention of most buildings, structures, and cultural landscape components. Composite viewshed areas shown in Figures E-7, E-8, and E-9 in Appendix E 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 would occur during project implementation because of construction activities. The noise emissions from combustion-powered equipment, including diesel engine earth moving equipment, would be the primary contributors to the sound levels during construction, and could 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 to 100 A-weighted decibels. The major sources of construction noise in this alternative may include removal of buildings, hauling, grading, paving, and restoration and rehabilitation of buildings and construction of new facilities. Construction noise would be relatively short in duration and would be restricted to daytime hours in winter when visitation is lowest. Future noise levels under Alternative E would be in the 50 to 60 A-weighted decibels range, with maximum levels (over short periods of time) exceeding 70 A-weighted decibels for loud vehicles.

4.7.6 Impacts on NPS Operations

Alternative E would have direct, short-term, moderate, adverse effects on park operations because of the requirements for funds and staffing to implement the removal of 15 to 17 contributing and 23 noncontributing buildings in the Elkmont District. Over the long term, the indirect benefits gained from the removal of these structures and, thus, the eliminated requirements for their maintenance would be minor.

E1 also would include modifications to existing infrastructure, increasing the number of parking lots and paving with pervious pavement, and the restoration of 32 buildings, including the restoration and rehabilitation of the Appalachian Clubhouse as a public day use rental facility. This immediate construction and preservation work would have direct, short-term, moderate, adverse effects on park operations.

Under Alternative E2, the Wonderland Hotel would be reconstructed and the Wonderland Annex would be rehabilitated. Together, they would be used to provide public lodging. The additional, short-term, operational costs to complete the Wonderland Hotel and Annex would have major, adverse effects on park operations.

Alternative E would create direct and indirect, major, adverse effects on NPS operations. All of the new visitor facilities, exhibits, and infrastructure would have to be maintained by NPS staff, adding to current operation and maintenance costs. The need for funds or staff to protect the buildings from vandalism or further deterioration would be substantially increased compared to the No Action Alternative.

Although maintenance of the cabins and the 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, the day use facilities at the Appalachian Clubhouse, and the general infrastructure (roads, 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,

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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 situations that may arise. Law enforcement needs would increase so much that housing and funding for a full-time ranger (level GS-9) would be required to police the exhibits and buildings.

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 fall on an annual basis (Runkle 1982). Therefore, hazard trees adjacent to exhibits, trails, roads, and buildings would be removed to reduce the risk that visitors could be harmed by falling trees. The indirect effect on NPS operations because of hazard tree and other vegetation management would 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 contributing structures from this period of significance in the Park. The District's buildings represent the only remaining representative group of this type and time period in east Tennessee (Thomason *et al.* 1993). Therefore, 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 6 to 20 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.

The influences of prior land uses and clearing for construction of roads, buildings, and the Elkmont Campground are evident in the heavily impacted condition of the Montane Alluvial Forest community throughout the District. The ongoing use within the Elkmont campground immediately adjacent to the project study area continues to create perpetual disturbances to this forest community. Because most of all land in the southeastern United States is privately owned, there are no assurances that these areas will remain forested outside of the national park. When viewed with other actions in the past, the present and the reasonably foreseeable future, both within and outside the Park, implementation of Alternative E would result in a long-term, major, cumulative, adverse effect because the opportunity to reestablish this rare plant community within the study area 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 in a portion of the District. However, these beneficial effects would be less than all previously discussed alternatives, including the No Action Alternative, 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 Outstanding National Resource Waters 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.

For wastewater, the impacts of other past, present, and reasonably foreseeable future actions occurring farther downstream, in combination with new impacts under Alternative E2, would result in overall diminished water quality in the Little River. Additionally, the increase in wastewater treatment and discharge would be in direct violation of the intent of the Outstanding National Resource Water designation for the Little River.

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 nitrogen oxide and volatile organic compound emissions resulting from implementation of Alternative E would be very small when compared to 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. Revegetation 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 move into surrounding areas of the Park.

Cumulative adverse effects to NPS operations would occur as a result of implementing Alternative E. These primarily would result from the costs of project implementation and operations within the District following project completion.

Even with a projected shortfall in funding, every law enforcement position continues to be filled immediately, so that the safety and emergency response expected by visitors is not compromised. Therefore, the additional law enforcement requirements associated with Alternative F would decrease the funds that could be used for elements in the Park's budget.

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If Alternative E was implemented, funding of the entire project implementation would have to be provided from another source. In the long-term, additional funds would have to be reallocated from other programs in the Park to meet maintenance and concessioner management needs. This would result in long-term, major, adverse, cumulative impacts on Park operations.

4.7.8 Conclusion

Implementation of Alternative E would create major, adverse impacts to native plant communities where buildings were retained, resulting from the loss of potential for the long-term recovery of these resources. Disturbances to the forested ecosystem because of the retention of buildings and associated activities under this alternative would eliminate critical biological components that are necessary for characteristic forest stand development through time. The 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 would 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 long-term productivity of biotic resources would be adversely affected because of the retention of buildings, new paving, installation of infrastructure, and increased visitation 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 all would be beneficial effects. Other areas that would benefit from Alternatives E would include visitor facilities and visitor experience. In addition, revenues achieved through rental of the Appalachian Clubhouse as a public day use rental facility could offset the long-term maintenance and management costs associated with this alternative.

Irretrievable commitments of resources from Alternative E would result from 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 because of 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 because of increased internal trips to view exhibits and increased visitation.

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 would result from 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 trampling of vegetation; 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 were 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, and creation of more parking spaces to accommodate increased traffic. It also would require 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 because of 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 there would be less restoration and revegetation in the District.

The proposed concession operation under E1 would allow the concessioner to rent seven cabins and to provide the eco-tourism options to visitors. Under E2, the concessioner would have the ability to rent the cabins, plus the reconstructed Wonderland Hotel and the Annex, and to provide food service to all of the lodging guests.

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 the furniture, fixtures, and equipment necessary to run their operation and still have a reasonable opportunity to make a profit. Although the study did not analyze the feasibility of E1, the income and profit levels in E1 would be substantially lower because 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 would only be seven cabins to rent to visitors and no food service, a thorough economic analysis of this alternative would have to be completed if it was 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 was selected, a more thorough analysis of the selected alternative would be required to verify the feasibility of these alternatives and develop a concessions contract.

In accordance with the terms of the National Parks Omnibus Management Act of 1998 (16 *United States Code*, Section 1a 5), and *Management Policies 2006* (NPS 2006), the National Park Service is responsible for determining whether 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 considered in this analysis, including:

- the potential for adverse effects to Park resources that may be caused by a concessions operation

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- 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, siting, 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
- 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 factors listed above and other considerations in 16 *United States Code*, Section 1a 5 and *Management Policies 2006* (NPS 2006), the National Park Service 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 F1 would retain 46 out of the 49 contributing buildings in the District with the removal of three buildings: a cabin, and the Wonderland Hotel and Annex. Fourteen buildings constructed in the 1970s or later are considered noncontributing and would be removed. Removal would be carried out by mechanical means or by hand. Contributing buildings to be retained under Alternative F1 would include cabins and the Appalachian Clubhouse in Daisy Town; cabins and associated buildings in Society Hill; cabins in Millionaire's Row; cabins in the Wonderland Club. F2 also would include reconstruction of the Wonderland Hotel and restoration and rehabilitation of the annex.

Day-use visitation as a result of implementing Alternative F would increase by an average of 36 visitors per day, plus an estimated maximum of 226 or 278 guests (depending on whether F1 or F2 was implemented) utilizing overnight lodging. The length of an average daily visit would increase because of the various opportunities provided by day use of the Appalachian Clubhouse, the walking tour through Daisy Town, the 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. However, 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

4.8.1.1 Buildings and Cultural Landscape

Implementation of Alternative F would result in direct, long-term, minor, adverse effects to the buildings within 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. Nearly all 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 F1, Cabin #36 has substantial portions that have collapsed and the Wonderland Hotel was removed following a major collapse in August 2005. The hotel annex remains in fair to poor condition, despite stabilization efforts. The Wonderland Hotel was documented for the Historic American Building Survey in 2003.

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

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under this alternative as would other eligible cultural landscape features. The preservation and restoration of the retained cabins, the rehabilitation of the clubhouse, and, if F2 was implemented, the reconstruction of the Wonderland Hotel, would be conducted in accordance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (The Secretary of the Interior 2005).

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, pumping station access hatches and electrical control panel, a booster pump station, and stream bank stabilization work at culverts where erosion has occurred.

Under Alternative F, there would be direct, long-term, 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 substantial increase in visitation. These adverse effects would include traffic congestion, along with wear and tear from increased pedestrian traffic at the Appalachian Clubhouse; the Wonderland Hotel and Annex (if F2 was 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).

Direct, long-term, minor to major, 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 was chosen). Direct, long-term, minor, beneficial effects would result from the retention of most of the District's cultural landscape characteristics and features. Restoration, rehabilitation, preservation, and reconstruction of the retained buildings would be conducted in accordance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (The Secretary of the Interior 2005), as would the restoration of the noncontributing Swan building (#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 stream bank stabilization at eroded culverts would create indirect, long-term, minor, adverse effects on District 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 electrical lines would be buried in the ground, thereby removing intrusive power poles that postdate the period of significance. The burying of electrical lines would have minimal, if any, effect on the existing topography, spatial organization, or land use patterns of historic district or cultural landscape. Once the underground utility lines were installed and the trenches were backfilled, the disturbed ground would be restored to its preconstruction contour and condition. Any adverse impacts associated with construction during the installation of underground utilities would be short-term and negligible.

The belowground pumping stations would not be visible, except for small access hatches placed flush with the ground surface. The pumping station behind the Wonderland Hotel would have an

aboveground electrical control panel about 2 or 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 and located away from the District buildings in an area where it could be screened.

The long-term, adverse, 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, would be moderate in intensity, because of the numbers of visitors and vehicles projected and the more intensive use proposed for many of the buildings and features slated for retention.

4.8.1.2 Archeological Resources

The potential for Alternative F to impact archeological resources would depend on the extent and location of ground-disturbing activities. This alternative would retain the greatest number of buildings for reuse either as lodging, day use, or 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 long-term, 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, long-term, 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 would include three additional loci where potentially significant resources have been identified. These could be adversely affected by installation of the Little River Trail and Wonderland Hotel parking areas and by installation of sewer and water lines.

The impacts to archeological resources because of 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.

4.8.1.3 Section 106 Determinations

Under Section 106 of the National Historic Preservation Act, the removal of one to three contributing buildings within the National Register of Historic Places-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.

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All mitigation would be determined through formal consultation with the Tennessee State Historic Preservation Office, the Advisory Council on Historic Preservation, The Chickasaw Nation, The Eastern Band of Cherokee Indians Tribal Historic Preservation Officers, and other consulting parties, as appropriate. The exact types and cost of the mitigation cannot be calculated at this time.

4.8.2 Impacts on Natural Resources

Impacts to natural resources because of 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 would be similar to that described for Alternative E, but would be greater because of the 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 would remove 14 buildings in Elkmont Historic District (12 if F2 was chosen). As a result, direct, short-term, moderate, adverse effects on soils would occur during project implementation if heavy machinery and other equipment were used for removal of the buildings and for the installation of new water and sewer lines, underground power 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 National Park Service to minimize impacts to soils.

In the long term, the number of visitors would increase by approximately 7 percent and internal pedestrian trips would increase by 54 to 80 percent (depending on whether F1 or F2 is implemented, Table 4-8). Soil compaction and related indirect, adverse impacts to plants because of trampling would be moderate for F1 and major for F2.

Additional activities required under Alternative F that would create direct, long-term, major adverse effects would include construction of six parking lots under F1, or seven parking lots and the expansion of another under F2; a gravel parking area; installation of water and sewer lines (including gravity sewer service lines for the Wonderland Hotel and Annex if F2 was selected); a 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 short-term.

The new bridge construction across the Little River is of particular concern because of 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 was reestablished, the erosion rate would decline and adverse effects on soils would decrease in those areas where pipes and bridges were installed.

Effects on soils would result from some elimination and some addition of paved or impervious surfaces. About 0.79 acres of impervious surfaces in F1 and 0.32 acres in F2 would be eliminated when the buildings were removed (see Table 4-3). Rates of runoff and soil erosion would decrease in those areas and long-term beneficial effects on soils and adjacent waterways would be provided. Other elements would involve paving 2.4 acres with pervious pavement in F1 and 3.5 acres in F2. In both of these options, the newly paved area would be greater than the restored ground, and the direct, long-term effects to soils would be major and adverse. Once vegetation was 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.

Both Alternative F options would increase the number of visitors and the number of internal pedestrian trips (see Table 4-7 and 4-8). Additional adverse impacts would occur because of soil compaction and related impacts to plants from trampling.

Pervious concrete would be used in parking areas and paths, and some infiltration would occur where this material was used. However, the surface would produce higher rates of runoff than would occur with the No Action Alternative (see Table 4-5). The increases would be 5.6 percent with F1 and 6.9 percent under F2, and would result in indirect, long-term, major adverse effects on soils because it would result in additional soil erosion and subsequent sedimentation of surface waters.

4.8.2.2 Biotic Communities

Terrestrial Plant Communities. Most of the contributing structures 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. Compared to the No Action Alternative, major, adverse effects to terrestrial plant communities would occur because chronic disturbance of vegetation would continue throughout the District in association with the retention and proposed use of most buildings, pedestrian traffic, and hazard tree management. 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 substantial 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 would be long-term and major, and would occur over a larger area in this alternative than in any other alternative because almost all buildings would be retained. Effects would be incrementally greater if F2 was implemented, because of retention of the

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

In Millionaire's Row, Daisy Town, Society Hill, and the Wonderland Club, the majority of the buildings would 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 Millionaire's Row area 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 would occur during construction. During this period, excavation would disturb vegetation and most likely require removal of smaller trees and root masses. The possible use of heavy equipment for removing buildings 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 increases in visitation pedestrian traffic would further increase the stress on plant communities and wildlife habitat. Visitation under this alternative would be at the highest level of all project alternatives. The higher visitation would be accompanied by a proportional increase in the improper storage and disposal of food items. Food brought into day use areas and the resulting garbage would attract wildlife, increasing the potential for human/wildlife encounters. Interactions with black bears, raccoons, and even rodents can be dangerous for both the humans and animals involved. Increased traffic would also increase the potential for vehicular collisions with wildlife. These indirect, adverse effects on wildlife would be minor because they would affect individuals and not entire populations.

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 because of 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 would all result in temporary disturbance within and adjacent to the floodplain of the Little River. Protocols for impact avoidance measures have been developed by the National Park Service to minimize the potential for adverse effects to biotic communities (see Section 2.10). Even with incorporation of these measures, the work may result in unavoidable, yet negligible discharges of sediment into aquatic environments.

The 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 would result in trampling of vegetation and loss of soil stability. Increased traffic and parking would increase the deposition of petrochemicals that, when mixed with rainfall runoff, could contaminate nearby 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, because none are known to occur within the proposed project implementation area. A state-listed threatened species, butternut, and two state special concern species, Fraser's sedge and chamomile grapefern, occur within the District. Because many of the buildings would be retained

under Alternative F, and visitation would increase following project implementation, no increases in suitable habitat for threatened, endangered, rare, and sensitive species would occur. Because of the increased visitation to the area, the potential for trampling of herbaceous vegetation by pedestrians would 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 National Park Service for that reason.

The hellbender 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 exists 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 would be minor. Following project implementation, increased impervious surfaces and associated runoff could result in indirect, long-term, 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. However, retention of most of the buildings would preclude an increase in grassy habitat that is favored by the firefly. Increased visitation could potentially result in long-term, moderate, adverse effects on synchronous firefly populations in the District as more grassy areas were trampled by pedestrians.

The long-term, indirect effects to threatened, endangered, rare, and sensitive species would be moderately adverse because of impacts on existing and potential habitat (Table 2-22).

4.8.2.4 Wetlands

If heavy equipment was used in wetlands within Millionaire’s Row, short-term, direct, minor, adverse effects to wetlands would occur during project implementation as a result of disturbance created by these machines. The environment of the wetlands along Bearwallow Branch is not suitable for machine traffic or heavy pedestrian traffic because of saturated soil conditions.

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 because of implementation of either of these alternatives would be adverse, but minor. Wetlands may be affected by the retention and use of nearby buildings, such as those 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 often produce loss of native plant diversity and subsequent degradation of wildlife habitat.

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

4.8.2.5 *Water Quality*

Surface Water Runoff. Alternative F would result in changes to surface water runoff rates and volumes, and would discharge additional treated effluent into the Little River. Because the Little River is listed as an Outstanding National Resource Water, any adverse effect could create considerable impacts. Water quality impacts that would result from implementation of these alternatives are described below.

Alternative F would include the most intense use of the buildings throughout the District. During the project implementation period, construction activities could result in ground disturbance caused by heavy equipment and the movement of construction vehicles associated with the removal of some buildings; restoration, rehabilitation, or reconstruction of other buildings; and installation of infrastructure, including sewer and water lines, parking areas, and electrical service. Although best management practices would be followed, erosion and sedimentation into water bodies could still occur during project implementation. This would result in indirect, short-term, minor, adverse effects on water quality during construction. However, once disturbed areas were planted and vegetation was established, these effects would be reduced.

As described under soils, increases in areas covered by impervious surfaces or pavement would increase compared to the No Action Alternative. This would produce a 5.6 percent increase in runoff in F1 and a 6.9 percent increase in F2 (Table 4-5). The indirect, long-term, adverse effects on water quality from the increased runoff would be moderate for E1 and major for E2.

Sewage Treatment and Pollutant Discharge. Elements of Alternative F that would require increased wastewater management compared to the No Action Alternative include

- rehabilitation of the Appalachian Club interior for day use, which would require public restrooms
- rehabilitation of cabins in the Millionaire's Row, Society Hill, and Wonderland areas for public lodging
- in F2 only, reconstruction of the Wonderland Hotel and Annex for lodging.

The additional wastewater treatment requirements for these improvements are estimated at 14,954 and 23,467 gallons per day for F1 and F2, respectively (Table 2-18).

The additional daily flows for F1 and F2 would cause the total projected peak flow to exceed the current capacity of the wastewater treatment plant during many days of the busy summer season. 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 be in direct violation of these regulations, creating an indirect, long-term, major, adverse effect on water resources.

There are not any baseline conditions established for thermal loading, other than typical wastewater temperatures of 60° Fahrenheit (see Section 3.2.4.4). However, the incremental increase in effluent discharged in this alternative would result in negligible temperature effects in the Little River. The effluent discharge *rate* would remain the same as the existing condition (40 gallons per minute) under all alternatives. At the current rate of discharge, thermal impacts are dissipated entirely within 3 feet of the discharge pipe. Because 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.

Wastewater components required under Alternative F would include sewer lines, low-pressure sewer force mains, a sewage pump station, and grinder pumps behind cabins used for public lodging. Installation of these sewage system components would require additional ground disturbance that would result in short-term erosion. However, many of the sewer pipelines would be installed in areas along roadsides that have already been disturbed. When vegetation was reestablished in those areas, the potential for erosion and sedimentation from the ground disturbance would be eliminated.

To cross streams, pipelines would be suspended under bridges rather than placed under the streambed. If lines could not 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 because of the installation of pipes and other wastewater treatment infrastructure components.

4.8.2.6 Floodplains

Direct, short-term, minor, adverse effects on the 100-year floodplain would occur as a result of implementing Alternative F because of temporary increases in erosion and sedimentation during project implementation. Over the long term, this alternative would create direct and indirect, moderate, adverse effects on floodplains by increasing the amount of impervious surfaces and the erosion potential throughout most areas of the District. The parking areas, road 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 stabilize the soil and facilitate precipitation infiltration. This effect would be most evident in Millionaire's Row, which was constructed within and adjacent to the floodplain of the Little River and Bearwallow Branch.

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), would be contrary to NPS policy that expressly prohibits development within floodplains and would require a formal statement of findings if this alternative was implemented. According to Director's Order #77-2, the National Park Service 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 were installed. Of particular concern are the Spivey soils adjacent to Bearwallow Branch, which have a high organic content and, as such, are very susceptible to damage from vehicular traffic. As a

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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.

Two buildings that are located within the 100-year floodplain would be removed, Burdette (#16) and Young (#48), [fix map for cabin 48]. Their removal would result in direct and indirect, long-term, negligible beneficial effects to floodplain functions. 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, increasing floodplain storage, and eliminating potential future ground disturbance and soil compaction associated with residential use.

4.8.2.7 Air Quality

As in the No Action Alternative, there would be a temporary increase in emissions under Alternative F because of 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 was in good operating condition, and performing construction from October to March when ozone is least likely to form.

Visitation to the District would increase following implementation of both F1 and F2. Air emissions would increase from increases in vehicular traffic and by how this traffic moved throughout the District. Increased engine idling times would generally occur as traffic congestion caused increases in travel time along roads, within parking areas, at gates, and at destination points that were visible from the road, such as at wayside exhibits. As a result, projected increases in visitation would be accompanied by a lower level of service on roads servicing the District and more air emissions.

Visitation and internal vehicular trips would rise under Alternative F (see Table 4-7 and Table 4-8). As described in Section 4.4.2.7, an analysis was performed to evaluate the potential nitrogen deposition and nitrogen dioxide impacts from these uses. The results of an analysis showed impacts very far below the nitrogen deposition threshold of 0.01 kilograms per hectare per year.

In an air quality assessment based on a busy Saturday in the summer, the year 2015 air emissions that would result from Alternative F would result in an 8.03-tons-per-year increase of nitrogen oxide emissions and an 11.31-tons-per-year increase in volatile organic compound emissions, compared to the No Action Alternative (Table 4-6). The increases in emissions for each of these pollutants would exceed 5 tons per year over the existing condition (see the threshold definitions in Table 4-1), resulting in indirect, long-term, major, adverse effects on air quality under Alternative F.

Although this increase would be insignificant when compared with total emissions in the Park, it would be substantial in terms of the volatile organic compounds and nitrogen oxides 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.

4.8.3 Impacts on Interpretation and Visitor Use

4.8.3.1 Visitor Experience

Negligible to minor, short-term, direct adverse effects to the visitor experience would 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.

The primary focus of this alternative would be 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 would be restored and rehabilitated. Both would be used for 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 and Annex, guests renting the cabins, and the general public to experience education-based programs within the District and the Park. These programs would include, but not be limited to, cultural resource education-based opportunities.

A variety of interpretive features and facilities are proposed under Alternative F. These components would provide long-term, major benefits to the visitor experience within the 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.

Although removal of some of the buildings and restoration and preservation of others is not expected to substantially 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 installing an 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.

For visitors who see the contributing structures as an important visual and cultural asset, the restoration and rehabilitation of 46 contributing buildings under F1 and 48 contributing buildings under F2 would create direct and indirect, long-term, major, beneficial effects. It would also have direct and indirect, long-term, minor adverse effects as a result of removing three contributing buildings under F1 and negligible adverse effects as a result of removing one contributing building under F2. 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 of the Interior's Standards for the Treatment of Historic Properties* (The Secretary of the Interior 2005).

Alternative F would create direct and indirect, long-term, major, adverse effects for those visitors who see the buildings as detracting from the natural environment by retaining most buildings. For this same group, the beneficial effects from removing three contributing buildings under F1 and 14 non-contributing buildings under both options would be long-term and negligible.

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The considerable increase in visitation under Alternative F would create indirect, long-term, major, adverse impacts to the visitor experience. The exhibits, improved infrastructure, lodging, and educational opportunities offered under both options of Alternative F would create user demand conflicts, such as those associated with traffic congestion and traffic safety hazards, increased deterioration of cultural and natural resources because of 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 F would also result in a long-term, major, adverse effect on the visitor experience within the Elkmont Campground for the same reasons.

4.8.3.2 Visitor Facilities

There would be major, direct and indirect benefits to visitor facilities as a result of implementing Alternative F. Most of the contributing structures throughout the District would be retained for a variety of uses. As discussed in Section 4.8.3.1, 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 would 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 entered the District and most of the major sections of the District.

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, constructing asphalt walking paths, and restoring 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 extend to all people staying overnight in the cabins. The concessioner would also provide educational opportunities which would be 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 National Park Service is required to first examine whether this is a necessary and appropriate use for facilities within a national park (see the discussion provided in Section 4.8.8). In addition, the decision regarding whether to reconstruct the hotel must follow U.S. Department of the Interior guidelines. Both management policies reiterate that reconstruction can only occur with specific, written approval by the Director after a policy review at the Washington office level. If reconstruction was chosen, it would have to be undertaken in accordance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (The Secretary of the Interior 2005), and the building would retain its status as contributing to the District, even though it would not retain historic integrity of the fabric or its authenticity (NPS 2006).

4.8.4 Impacts on Socioeconomic Environment

4.8.4.1 Land Use

Implementation of Alternative F would indirectly result in long-term, moderate, adverse effects to land use. These effects would occur by retaining 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 *General Management Plan* (NPS 1982b) that would result in an increase in the visitation to the District and the internal trips within the District (see Tables 4-7 and 4-8). Implementation of Alternative F would continue to allow for use of public road corridors, accommodations at the existing quarters, and picnicking and camping at the Elkmont Campground.

Historical and natural resource interpretation would increase over that which would be offered by the No Action Alternative through installation of a variety of exhibits, retention of some buildings for interpretive uses, and use of 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, in 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 would result in land use conflicts, including degradation of air quality, visual and aesthetic impacts, traffic congestion, and crowding.

4.8.4.2 Access and Circulation

Alternative F would create direct, short-term, minor, adverse effects on access and circulation during construction as traffic delays were created by movement of construction vehicles to and from the District. 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. These measures would reduce the potential for short-term, adverse effects to access and circulation.

Over the long term, indirect, major, adverse effects on traffic and circulation would occur within the District. Alternative F would provide 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, an estimated 1,625 additional trips per day would occur on District roads under F1, or 2,057 additional trips per day if F2 was chosen (Table 4-7).

To alleviate potential conflicts between vehicles and pedestrians, a number of road modifications would be made. 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, and Level F indicating traffic delays that can be severe. A change from Level A to Level C would result in a decrease in average

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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

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*, represented by the No Action Alternative, was implemented.

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 because of retention of the buildings and structures, as well as installation of new infrastructure components, including parking areas, paths, and electrical, sewer, and water supply components that would further degrade visual quality.

Direct, adverse impacts to the District viewshed would 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 E) 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 because of retention of most buildings, structures, and cultural landscape components. Composite viewshed areas shown in Figures E-7, E-8, and E-9 in Appendix E) 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 would occur during project implementation because of construction activities. The noise emissions from combustion-powered equipment, including diesel engine earth moving equipment, would be the primary contributors to the sound levels during construction, and could 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 to 100 A-weighted decibels. The major sources of construction noise in this alternative may include removal of buildings, hauling, grading, paving, and restoration and rehabilitation of buildings and construction of new facilities. Construction noise would be relatively short in duration and would be restricted to daytime hours in winter when visitation is lowest. Future noise levels under Alternative F would be in the 50 to 60 A-weighted decibels range, with maximum levels (over short periods of time) exceeding 70 A-weighted decibels for loud vehicles.

4.8.6 Impacts on NPS Operations

Alternative F would have direct, short-term, minor to moderate, adverse effects on park operations because of the requirements for funds and staffing to implement the removal of one to three contributing and 14 noncontributing buildings in the Elkmont District. Over the long term, the indirect benefits gained from the removal of these structures and, thus, the eliminated requirements for their maintenance would be negligible.

Alternative F also would include modifications to existing infrastructure, increasing the number of parking lots and paving with pervious pavement, and the restoration of 46 to 48 buildings, including restoration and rehabilitation of the Appalachian Club for day use and use of most cabins, except those in Daisy Town and the Chapman cabin (#38), for public lodging. This construction and preservation work would have direct, short-term, major, adverse effects on park operations.

Under alternative F2, the Wonderland Hotel would be reconstructed and the Wonderland Annex would be restored and rehabilitated, and together they would be used to provide public lodging. The additional, short-term operational costs to complete the work on the Wonderland Hotel and Annex would have major, adverse effects on park operations.

Alternative F would create direct and indirect, long-term, major, adverse effects on NPS operations. The need for funds or staff to protect the buildings from vandalism or further deterioration would be substantially increased in this alternative compared to the No Action Alternative.

Although maintenance of the cabins and the 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, the day use facilities at the Appalachian Clubhouse, and the general infrastructure (roads, 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 substantially as a result of increased visitation, potential traffic and circulation problems, increased encounters with wildlife, and other situations that may arise. Law enforcement needs would increase so much that housing and funding for a full-time ranger (level GS-9) would be required to police the exhibits and buildings.

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The National Park Service would continue to manage vegetation to provide for visitor safety. Hazard trees adjacent to exhibits, trails, roads, and buildings would continue to be removed as needed to reduce the risk that visitors could be harmed by falling trees. The direct and indirect effect on NPS operations because of hazard tree and other vegetation management would 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 leave no opportunity for expansion of existing plant communities, including the globally imperiled montane alluvial forest. Montane alluvial forests are considered imperiled because only 6 to 20 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.

The influences of prior land uses and clearing for construction of roads, buildings, and the Elkmont Campground are evident in the heavily impacted condition of the Montane Alluvial Forest community throughout the District. The ongoing use within the Elkmont campground immediately adjacent to the project study area continues to create perpetual disturbances to this forest community. Because most of all land in the southeastern United States is privately owned, there are no assurances that these areas will remain forested outside of the national park. When viewed with other actions in the past, the present and the reasonably foreseeable future, both within and outside the Park, 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 study area 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 were retained.

Only six water bodies in the state of Tennessee are designated as Outstanding National Resource Waters. Four of these waters, including the Little River, are within the Park. 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, could 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.

For wastewater, the impacts of other past, present, and reasonably foreseeable future actions occurring farther downstream, in combination with new impacts under Alternatives F1 and F2, would result in overall diminished water quality in the Little River. Additionally, the increase in wastewater treatment and discharge would be in direct violation of the intent of the Outstanding National Resource Water designation for the Little River.

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 nitrogen oxide and volatile organic compound emissions resulting from implementation of Alternative F would be very small when compared to overall emissions in the Park and 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 would be the lowest level of disturbance to the historic district of all of the alternatives. The removal of these three contributing buildings would result in a long-term, adverse effect, but the overall cumulative effect to cultural resources would be minor because most of the contributing structures would be retained throughout the District. Two of the three contributing buildings proposed for removal have already collapsed, and the third, the 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.

Cumulative adverse effects to NPS operations would occur as a result of implementing Alternative F. These primarily would result from the costs of project implementation and operations within the District following project completion.

Even with a projected shortfall in funding, every law enforcement position continues to be filled immediately so that the safety and emergency response expected by visitors is not compromised. Therefore, the additional law enforcement requirements associated with Alternative F would decrease the funds that could be used for elements in the Park's budget.

If F1 or F2 was implemented, funding of the entire project implementation would have to be provided from another source. In the long-term, additional funds would have to be reallocated from other programs in the Park to meet maintenance and concessioner management needs. This would result in long-term, major, adverse cumulative impacts on Park operations.

4.8.8 Conclusion

Implementation of Alternative F would create major, adverse impacts to native plant communities where buildings were retained, resulting from the loss of potential for the long-term recovery of these resources. Disturbances to the forested ecosystem because of the retention of buildings and associated activities under this alternative would eliminate critical biological components that are necessary for characteristic forest stand development over time. The 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

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implementing Alternative F would 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 long-term productivity of biotic resources would be adversely affected because of the retention of buildings, new paving, installation of infrastructure, and increased visitation 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 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 all would be beneficial effects. Other areas that would benefit from Alternative F would include visitor facilities and visitor experience.

Irretrievable commitments of resources would result from Alternative F. These commitments would result in direct, long-term, minor, adverse effects on three contributing buildings, and cultural landscape characteristics and features (mainly "spatial organization" and "buildings and structures," see Table 3-3) and would occur principally because of 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) because of 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 because of 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 trampling vegetation, 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 NPS policy.

Alternative F would increase the potential for irreversible impacts to archeological resources. However, those effects could be eliminated or minimized 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, and creation of more parking spaces to accommodate increased traffic. It would also require 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 result in adverse effects on land use because of crowding and traffic congestion. Compared with all previous alternatives, Alternative F would provide the least opportunity for benefits to native plant communities as restoration and revegetation.

The proposed concession operation under F1 would allow the concessioner to rent 36 cabins and to provide fee-based resource education options to guests. Under F2, the concessioner would rent the cabins and the reconstructed Wonderland Hotel and the Annex. The concessioner also would provide food service to all of the lodging guests and public visitors. Day use of the Appalachian Clubhouse would be operated by the concessioner and would not result in revenue for the Park.

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 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 substantially lower because the hotel and annex would not be part of the concession operation. While it is 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 was 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 was 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.

In accordance with the terms of 16 *United States Code* Section 1a 5, and *Management Policies 2006* (NPS 2006), the National Park Service is responsible for determining whether 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, siting, 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 in 16 *United States Code* Section 1a 5 and *Management Policies 2006* (NPS 2006), the National Park Service 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.

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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 2-22) is provided as well, which includes details regarding some of the potential beneficial and adverse effects listed by resource for each alternative.

Consultation and Coordination



5.0 Consultation and Coordination

5.1 PUBLIC AND AGENCY INVOLVEMENT

5.1.1 Background

Between 1994 and 1999, Great Smoky Mountains National Park prepared three plans for management of the Elkmont Historic District (listed on the national register in 1994). The Advisory Council on Historic Preservation advised that the 1999 planning proposal constituted a new action compared to the direction provided in the 1982 *Great Smoky Mountains General Management Plan (GMP)*. As a result, the park initiated planning in 2001 to amend its 1982 GMP and develop a long-term management approach specifically for the Elkmont Historic District.

This *General Management Plan Amendment and Final Environmental Impact Statement* has included extensive consultation and participation by the public, government agencies, and other organizations. Initial public scoping began in 2002. A notice of intent (NOI) to prepare an environmental impact statement for the plan amendment was published in the *Federal Register* on March 31, 2004. The EPA notice of availability (NOA) of the *Draft General Management Plan Amendment and Environmental Impact Statement* was published in the *Federal Register* on February 10, 2006.

5.1.2 Public Meetings and Newsletters

Public meetings and newsletters were used to keep the public informed and involved in the planning process for the Elkmont Historic District. A mailing list was compiled and updated periodically. It consisted of members of governmental agencies, organizations, businesses, legislators, local governments, and interested citizens. During the planning effort, the park staff distributed five newsletters, and held six sets of meetings or workshops for the general public. The purpose of the newsletters and meetings was to provide information on the project and solicit public input. The last newsletter was distributed to the public in March 2006 to announce the location and time of the public meetings for the *Draft GMP Amendment / EIS*. Discussion of these meetings and a summary of public and agency comments and NPS responses are provided further in this chapter.

5.1.3 U.S. Fish and Wildlife Service Consultation

5.0 CONSULTATION AND COORDINATION

The planning team held several telephone conversations with staff at the Cookeville, Tennessee and Asheville, North Carolina Offices of the Fish and Wildlife Service in 2002. The purpose of these conversations was to discuss the project and the study area related to threatened and endangered resources, species occurrences, habitat requirements and characteristics and to obtain input from the agency on any potential issues. In October, 2003 the planning team initiated informal consultation with the U.S. Fish and Wildlife Service to determine the presence of federally listed threatened and endangered species in the Elkmont area of Great Smoky Mountains National Park. The Fish and Wildlife Service responded in November, 2003 that no records indicated the presence of federally listed or proposed endangered or threatened species within the impact area of the project. In January, 2006, the Fish and Wildlife Service was sent a copy of the Draft EIS for review of proposed alternatives and associated potential impacts. The Fish and Wildlife Service did not send the Park any comments on the Draft EIS.

5.1.4 Consultation with Native Americans

The National Park Service recognizes that indigenous peoples may have tribal interests and rights in lands now under NPS management. Native American concerns and issues regarding NPS actions are sought through consultations held on a government-to-government basis in accordance with applicable federal laws, executive orders, regulations, and policies. Consultation also fulfills requirements of Section 106 of the National Historic Preservation Act of 1966 (NHPA) as amended, and the National Environmental Policy Act of 1969 (NEPA).

Letters were sent to the following American Indian tribes on May 7, 2002, to formally invite their participation in the planning process:

- Cherokee Nation of Oklahoma
- United Keetoowah Band of Cherokee Indians
- The Eastern Band of Cherokee Indians
- The Chickasaw Nation

Two of the tribes consulted by the park, the Chickasaw Nation and the Eastern Band of Cherokee Indians, responded to the Park regarding their interest in the project and became consulting party members. Consultation occurred throughout the process with these tribes, with particular emphasis on archeological surveys within the district. The Eastern Band of Cherokee Indians provided comments on the “Cultural Resources of the Elkmont Historic District” report related to archeological resources in September 2002. Members from the Eastern Band of Cherokee Indians also conducted an on site visit with Park staff in October 2002. Informal correspondence and updates were conducted and provided between these two tribes and the Park throughout the course of this planning process. Copies of the Draft EIS were sent to the Chickasaw Nation and the Eastern Band of

Cherokee Indians in January, 2006. The Park did not receive any formal comments from either tribe on the Draft EIS.

5.1.5 Section 106 Consultation

Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470, et seq.) requires that federal agencies take into account the effect that their undertakings on properties listed in or eligible for listing in the National Register of Historic Places. The Elkmont Historic District's listing in the national register led to consultations early in the planning process between the National Park Service, the Tennessee Historical Commission (State Historic Preservation Office), and the Advisory Council on Historic Preservation. Public involvement procedures were followed that integrated the requirements of the National Historic Preservation Act with those of the National Environmental Policy Act (NEPA).

Consistent with 36 CFR 800, regulations implementing the National Historic Preservation Act, the National Park Service invited other interested groups and individuals to participate in the consultation process as consulting parties. The consulting parties have demonstrated substantial interest in this and previous planning efforts for Elkmont. In addition to the Advisory Council and the Tennessee Historical Commission, the following additional groups have participated in Section 106 consultations:

- The Elkmont Preservation Committee
- National Parks Conservation Association
- National Trust for Historic Preservation
- Sierra Club
- Smoky Mountains Hiking Club

Over the course of this planning effort, the National Park Service has held six meetings with the consulting parties. The last meeting was held in June 2006 after the public review of the *Draft GMP Amendment / EIS*. Additional meetings and correspondence have occurred with the Tennessee Historical Commission and Advisory Council. For a summary of the consulting parties meetings, see Table 5-1 below. For a record of correspondence received from the Tennessee Historical Commission and the Advisory Council following the publication of the *Draft GMP Amendment / EIS*, see *Letters From Government Agencies* in Chapter Six, Volume II.

The following table is a brief summary of the newsletter distribution and general public and consulting party meetings conducted up through the preparation of this FEIS.

Table 5-1: Summary of Public Involvement

Date	Event	Purpose	Topics Discussed/Result
4/25/2002	Focus Group Meeting (Focus group subsequently became “consulting parties”)	Obtain input from stakeholders	NPS invited focus group members to be consulting parties, including: Advisory Council on Historic Preservation (ACHP) Elkmont Preservation Committee (EPC) National Parks Conservation Association (NPCA) National Trust for Historic Preservation Sierra Club Smoky Mountains Hiking Club Tennessee Historical Commission (TN SHPO) The Chickasaw Nation (THPO) The Eastern Band of Cherokee Indians (THPO)
4/2002	Newsletter #1	Announcement of public meetings	The newsletter announced the May 2002 public meetings, and presented the background and purpose of the planning process for Elkmont.
5/1 /2002 and 5/2/2002	Public Meetings	Introduce GMP Amendment and EA to the public	An overview of the NEPA planning process was presented. The public was asked for their input on what was important to them about Elkmont, what activities at Elkmont were most enjoyed, and how Elkmont should be managed. The comment form was also available online, at the Sugarlands Visitor Center and at locations within the Elkmont Historic District. A total of 84 people attended the two public meetings. 554 responses were received through the meetings, comment forms, and letters, which were used to develop draft project goals.
8/2002	Newsletter #2	Announcement of public meetings	The newsletter announced the August 2002 public meetings, provided a summary of baseline studies completed for Elkmont, and summarized the previous public survey results.
8/19/2002 and 8/22/2002	Public Meetings	Input on draft goals and objectives; presentation of baseline studies	An overview presentation of baseline information was provided and followed by facilitated group sessions on project goals, objectives and potential site uses. Input from these public meetings was used to create conceptual alternatives. A total of 86 people attended both meetings.

Date	Event	Purpose	Topics Discussed/Result
9/28/2002	Public Workshop on Conceptual Alternatives	Input on conceptual alternatives; gather historical information on Elkmont	47 people attended the September workshop. Workshop attendees rejected the four conceptual alternatives presented for discussion and were given an opportunity to modify them. Most attendees represented former leasees who wanted to save as many buildings as possible, minimize administrative uses, and maximize possible cabin rental and reuse of the Wonderland Hotel. Privately held historical photos of Elkmont were recorded.
10/8/2002	Consulting Parties Meeting	Review of previous public meetings	Consulting parties were briefed on the second set of public scoping meetings and the public workshop. The need to present a full range of alternatives was highlighted, including a “no-action alternative” and one that emphasized visitor services. The alternatives presented at the September 28th public workshop were abandoned as a result of this Consulting Parties meeting and the public workshop. A process for developing an entirely new set of alternatives was begun as a result of this meeting.
10/21/2002	Public Forum	Information session	An information session for North Carolina residents about planning projects in Tennessee was held in Asheville, NC. Park staff fielded questions from members of the public about planning projects in Cades Cove and Elkmont.
1/14/2003	Consulting Parties Meeting	Review of conceptual alternatives	Six foundation statements and the resulting conceptual alternatives based on previous public comment were reviewed. Consulting parties made suggestions concerning the no- action alternative and provided direction on alternative analysis to include natural and cultural resource impacts, the area of potential effect, and the need to identify potential impacts to archeological resources.
1/2003	Newsletter #3	Announcement of public workshop	The newsletter announced the upcoming public workshop (2/1/2003) to present the plan alternatives and provided an update of the public involvement.
2/1/2003	Public Workshop	Present six conceptual alternatives for public comment	Over 180 members of the public attended the workshop. Their viewpoints were divided, with most supporting either no-action or a maximum visitor services approach. Those few supporting the mid-range alternatives suggested incorporation of more protection of natural resources, cost reductions or increases in the number of buildings rehabilitated for public overnight use.

5.0 CONSULTATION AND COORDINATION

Date	Event	Purpose	Topics Discussed/Result
8/20/2003	Consulting Parties Meeting	Provide update on project status	The Wonderland Hotel, if utilized, would require reconstruction rather than restoration under <i>The Secretary of the Interior's Standards for the Treatment of Historic Properties</i> due to the failed condition of this building.
2/2004	Newsletter #4	Explanation of change from EA to EIS; Invitation to meetings	This newsletter announced the upcoming public meetings, discussed project history and the need to elevate the environmental compliance process to that of an environmental impact statement. It summarized the no- action alternative and alternatives A-F. Addresses for sending comments were provided.
3/8/2004 and 3/9/2004	Public Meetings	First scoping meetings held as part of EIS process	Over 149 people attended these meetings where the results of additional baseline studies and seven detailed alternatives were presented with a 30-day comment period. Comments received indicated a range of preferences from removal of all historic buildings to complete restoration and rehabilitation, including reconstruction of the Wonderland Hotel for public lodging. Comments focused on funding, potential loss of cultural resources, potential impacts to natural resources, concerns with water quality in Little River, NPS requirements for "necessary and appropriate" analysis, traffic congestion, and use of buildings.
4/6/04	Consulting Parties Meeting	Provide an update on the alternatives and discuss comments from the March public meeting	The results of the additional baseline studies and the seven draft alternatives were reviewed, as well as the comments made at the public information meeting and received from the general public as of that date. The maximum area of potential effect for cultural resource considerations was discussed.
1/2006	Draft EIS/GMP Amendment published	Document available for public review and comment	Previous four years of study and consultation published in a comprehensive report per regulations of the National Environmental Policy Act
3/2006	Newsletter #5	Announcement of upcoming public hearings on the <i>Draft GMP Amendment/EIS</i>	This brief newsletter announced the locations and dates of the upcoming public hearings on the <i>Draft GMP Amendment / EIS</i> . Information was provided about how the public could comment by letter or e-mail.

Date	Event	Purpose	Topics Discussed/Result
3/25/2006 and 3/27/2006	Public Meetings	Obtain public comment on the <i>Draft GMP Amendment/EIS</i>	A total of 79 people attended (signed in) at the meetings. An open house was held first, giving the public the opportunity to informally view project information and talk with park staff. A formal meeting format followed. Seven people submitted testimony at Gatlinburg and twenty six at Knoxville. In general the formal comments were divided. Most people testifying supported either removing all buildings or saving them for public use.
6/20/2006	Consulting Parties Meeting	Discuss options to avoid, minimize, or mitigate potential adverse effects to cultural resources for Alternative C.	The group discussed the required signatories for a Memorandum of Agreement. Concerns were expressed about the need to avoid, minimize, and mitigate adverse effects and how Alternative C could be adjusted in response to these effects. Discussion was raised about economic analysis and concessions—NPS analysis deemed concessions appropriate but not necessary. The ACHP and SHPO requested a map combining multiple layers of resources in the FEIS. Agreement was reached that potential adverse effects to archaeological resources would be addressed in the MOA. The ACHP and SHPO discussed the need for a “maximum avoidance” alternative.

5.0 CONSULTATION AND COORDINATION

A variety of other agencies were contacted and consulted during this planning process in addition to those listed in previous pages. In addition to coordination with NPS staff, agencies contacted for information regarding threatened and endangered resources, species occurrences, habitat requirements and characteristics, vegetation communities, soils mapping and water quality issues included:

- Tennessee Department of Environment and Conservation
 - (water quality, wastewater and permitting issues)
- Tennessee Natural Heritage Program
 - (threatened and endangered resources, vegetation community data)
- USDA Natural Resources Conservation Service
 - (soils mapping)



As the nation's principal conservation agency, the Department of the Interior has the responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.



Elkmont Historic District

Final Environmental Impact Statement and General Management Plan Amendment

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