

4.5.6.2.2 Visibility

Visibility of distant objects viewed from the nearest integral vista site (Mt. Cammerer) would not be noticeably impaired as a result of operation of proposed Section 8B. Because all other integral vistas in the GSMNP are located farther from the proposed route than is Mt. Cammerer, it is concluded that proposed Section 8B would not affect visibility at any integral vista observation site in GSMNP.

4.5.6.2.3 Conservatism of the Analysis

Analyses in this section assumed worst-case possibilities, or a worst-case combination of possibilities, for the proposed action and any of the associated options. Existing conditions, or reasonably foreseeable future background conditions, were incorporated into these analyses. Therefore the results can be taken as upper-bound estimates of the effects of the proposed action.

4.6 SOCIOECONOMICS

Traffic—especially tourism-related traffic—is expected to be the major “driver” of impacts in the study area, with or without construction of Section 8B. An influx of visitors has the potential to stimulate commercial development and create a demand for additional tourist accommodations and dwellings for new year-round residents. As a result, local land use patterns and communities’ established social and economic structures could be affected.

Even without construction of Section 8B, traffic flow in the impact area is expected to increase substantially between now and 2005, the year in which Section 8B would open if the project were built according to the proposed schedule. Projections for 2006, the closest year for which data are available, indicate that—compared with traffic counts made in 1994—approximately 1,100 additional vehicles would come to or through Cosby daily (from all directions), and close to 2,800 more vehicles would visit the Pittman Center area each day (for more details see Sect. 4.7). Over the following 20 years, the amount of traffic in the impact area is expected to continue to grow, with growth in the number of daily trips to Cosby and Pittman Center between 2006 and 2026 being expected to roughly equal the number of additional daily trips projected to occur between 1994 and 2006. The growth in traffic (especially trips by tourists) is expected to stimulate commercial growth adjacent to U.S. 321, perhaps creating pressure for more intensive development than many Pittman Center residents would like. In addition, many tourists traveling on U.S. 321 are likely to visit the arts and crafts community along Buckhorn Road, and this exposure to the Pittman Center area could increase the demand for seasonal and year-round accommodations.

Should Section 8B be built and opened to traffic, it is expected to divert hundreds of tourists’ vehicles daily from U.S. 321, but it would *induce* very few trips. Thus, the primary effect of Section 8B on area traffic would be to provide a scenic alternative route for tourists who would otherwise have used local roads to reach the same destination. Travelers using the Foothills Parkway would follow a route that lies north of U.S. 321 and traverses terrain that is sparsely populated, rugged, and heavily vegetated. In the vicinity of Pittman Center, Section 8B would run immediately adjacent to the existing town hall and elementary school, but much of the community

shares the rugged terrain, heavy vegetation, and undeveloped nature that characterizes the rest of this parkway segment. There also is some relatively flat, flood-free land within Pittman Center's municipal boundaries, much of it in close proximity to the Foothills Parkway ROW and Pittman Center Road, whose physical characteristics would make it relatively easy to convert to commercial or residential uses. Sections 4.6.1 through 4.6.9 present detailed discussions of prospective impacts in each socioeconomic subject area covered in Sect. 3.6 and brief treatments of environmental justice and cumulative impacts.

4.6.1 Population

Construction period. The NPS estimates that construction of Section 8B would require the same number of workers needed to build Section 8D, which is a peak work force of 69 persons (NPS 1995). These workers are likely to be subdivided into six work crews, organized by task. Since most of the crews would work intermittently over the life of the construction project, there would frequently be fewer than 69 workers on-site. If a local company were awarded the construction contract, the work force would be composed entirely of current residents of the study area. However, if a company located more than a 60–90 minute commute from the work site were selected, a number of workers would be expected to move to the project area from elsewhere. Again borrowing from NPS 1995, it is estimated that approximately 36 jobs (mostly foremen and highly skilled positions) would be filled by workers who would move to the local area from elsewhere. To be conservative, it is assumed that a nonlocal contractor would be chosen, and that the 36 inmoving workers would be accompanied by their families. Using the 1993 U.S. average household size of 2.63 (U.S. Bureau of the Census 1994), this means that a total of 95 persons could move to Sevier and Cocke counties during roadway construction. If all of these persons settled in Cocke County, it would represent an increase of only 0.3% over the 1994 population level. If all 95 new residents settled in Sevier County, a population increase of less than 0.2% would occur. In both cases (which represent the upper bounds of possible construction period growth), the effect on the host counties would be minimal.

Expenditures made by the workers and their employer during the construction period could create a number of "indirect jobs." Conservatively assuming a very high multiplier of 1.0 (meaning that one indirect job would be created for each construction job) and further assuming that all of these jobs would be generated locally, only 69 indirect jobs would be created in Sevier and Cocke counties. These indirect jobs, many of which would require relatively unskilled service workers, would be expected to be easily filled by existing residents and would be unlikely to cause any additional immigration of workers.

Operations period. By the time Section 8B would be opened to traffic in 2005, population in the impact area is expected to exceed current levels, with Sevier County growing at a considerably faster pace than neighboring Cocke County (see Sect. 3.6.2.2). Beyond 2005, area tourism and population both are likely to grow, with or without the Foothills Parkway. But the demand for vacation accommodations and year-round housing in Pittman Center, Cosby, and the rural areas in between could be increased slightly by Section 8B operations because travelers using this segment would be exposed to areas that they would see while using surface roads. This would not alter established patterns of development, but it could speed up the rate at which such development occurs. The population growth—both seasonal and permanent—directly attributable to parkway operations in any given year would be expected to be minor if the western terminus of Section 8B

were located at or near U.S. 321 or if there were no western interchange at all. If the western interchange were located at Pittman Center Road, population growth in Pittman Center could increase at a slightly faster pace than with the other interchange options—especially if Section 8B were opened prior to completion of Section 8C. Under these circumstances, many travelers would be exposed to substantially more of Pittman Center than if they stayed on the parkway or exited at U.S. 321. Under the no-build alternative, population growth would occur, but without the slight increase provided by completion of Section 8B.

4.6.2 Housing

Construction period. The addition of 36 new households to the impact area under the conservative population growth estimate would have only minor impacts on the local housing market. The 36 dwelling units that would be needed represent only 3% of all vacant rental units in Sevier and Cocke counties, and only 2% of all vacant units that are either for rent or for sale. Therefore, even with the most conservative population growth estimate, construction-induced demand for housing could be easily met by the existing housing stock.

Operations period. The number of year-round dwelling units and vacation rentals in the impact area is expected to grow between now and 2005, when Section 8B would be completed. This trend is expected to continue whether or not the proposed project is undertaken. The Consensus Map for Pittman Center developed through the Futurescapes process shows that local residents prefer that the year-round dwellings developed in that community in future years be entirely single family and primarily low density. As for rental accommodations, current community intentions—as documented in the Futurescapes final report—are to avoid high-rise hotels in favor of lower-intensity rental units such as cottages, a low-rise inn, and bread and breakfast facilities.

Completion of Section 8B could result in a slight increase in the rate at which permanent and seasonal housing units were built in Pittman Center, as a result of parkway travelers being exposed to the heart of the Pittman Center community. This acceleration in the existing pace of residential development would be minor if the western terminus of Section 8B were located at or near U.S. 321 or if there were no western interchange at all. A greater increase in the development rate could occur if the western interchange were located at Pittman Center Road—especially if Section 8B were opened prior to completion of Section 8C. With Section 8B open in advance of Section 8C, approximately 1200 additional daily automobile trips would be expected on Pittman Center Road between the Foothills Parkway and U.S. 321. This would approximately double the total number of vehicles using this stretch of road and triple the number of tourist-related trips. Under those conditions, it is possible that local landowners would put increased pressure on local government officials to allow higher-density tourist accommodations and year-round dwelling units to be built in the community to respond to perceived demand. Under the no-build alternative, year-round housing and vacation units would still be added to the area, but at a slightly slower rate and with less pressure to alter existing development patterns than under the build options discussed above.

In the Cosby community as well as in the more rural area extending westward along the Foothills Parkway ROW to Pittman Center, the completion of Section 8B—regardless of interchange location or the schedule for opening the various segments to traffic—is expected to slightly increase the rate at which permanent and seasonal residential units are developed. However, the

types of units that are added are not likely to be affected. Throughout the remainder of Cocke and Sevier counties, the opening of Section 8B is not expected to have any noticeable impact on the pace of housing development or the types of units that are constructed.

4.6.3 Public Services

For all public services except solid waste, operations period impacts would be greater if the western interchange of Section 8B were located at Pittman Center Road than if the interchange were located at or around U.S. 321 or there were no western interchange at all. As for timing options, opening Section 8B before the completion of Section 8C would increase impacts. Under the no-build alternative, public service demands would be expected to increase beyond current levels as a result of ongoing growth in the impact area, but these impacts would be less than for any of the build options considered here.

4.6.3.1 Education

Construction period. Approximately one-third (34.5%) of U.S. households have children under the age of 18 (U.S. Bureau of the Census 1994). Assuming that the 36 immigrating construction workers follow this national pattern, there would be 12 households with children under 18 moving to the impact area as a result of Section 8B construction. On average, each U.S. household with children under 18 has 1.96 such individuals. Based on this national average, it is assumed that 24 children under the age of 18 would accompany inmoving construction workers. Assuming an equal distribution of children from birth to 18 years, it is likely that 17 school-age children would accompany their parents to the impact area. This represents an average of only 1.3 construction-induced students per grade (Kindergarten through 12th). These students are likely to be distributed among several schools in Sevier and Cocke counties. But even if they all attended a single school, such a small number of students would not be expected to cause noticeable impacts.

Operations period. As noted in Sect. 4.6.1, Section 8B operations could slightly increase the rate of population growth in the impact area, and this effect would probably be greatest if the western interchange were located at Pittman Center Road and if Section 8B opened before Section 8C was complete. But even under such conditions, any effects on student enrollment and the demand for educational services would be likely to be minor. That is because population increases directly attributable to the parkway would probably be small and many schools in the impact area have the capacity to handle additional students and continue to make, and plan for, improvements in their facilities.

4.6.3.2 Water

Construction period. The small number of construction workers that could move to the impact area is not enough to noticeably impact local water systems and their ability to provide necessary services.

Operations period. The availability of safe, potable water is currently a major concern of Pittman Center residents. However, it is very likely that Pittman Center would be receiving water through a county-wide system within 20 years, and that the city could be receiving piped water by the time Section 8B were opened in 2005. In the absence of piped water, new dwellings and commercial

establishments would have to be served by individual wells and the allowable density of development would be limited. The slightly accelerated rate of relatively low-density residential development that could occur in Pittman Center as a result of Section 8B operations—and the accompanying demand for water—could probably be accommodated without difficulty by drilling new wells. But the development of higher-density residential settlements or commercial establishments in the heart of Pittman Center, both of which could be stimulated by an interchange at Pittman Center Road, could strain the community's ability to provide water service. Such problems would be alleviated, however, by the availability of piped water. As for Cosby and the rest of the impact area, there would be little or no impact to the availability or quality of potable water because of the minimal population increase that would be expected.

4.6.3.3 Sewer

Construction period. As with water, the small number of construction workers moving into the impact area is not expected to have any noticeable effect on the provision of local wastewater treatment services.

Operations period. Pittman Center currently relies on septic systems for its wastewater disposal. It is expected that a small additional need for wastewater treatment would accompany the slight increase in residential growth that could result from Section 8B operations. This minimal demand for treatment services could be accommodated by the construction of a limited number of new septic systems. However, the development of higher-density residential settlements or commercial establishments, which could result from a Pittman Center Road interchange, might exceed the treatment capacity available through individual septic systems. Such problems could be alleviated by a centralized sewer system, but this is not likely to be available in Pittman Center in the foreseeable future. In Cosby and the more rural areas elsewhere along the Section 8B ROW, the small increase in the rate of population growth that could occur would be expected to have little or no adverse effect on local wastewater treatment capabilities.

4.6.3.4 Solid Waste

Construction period. Because of the small size of the immigrating work force, solid waste disposal facilities in Cocke and Sevier counties would not be adversely affected by worker-generated wastes. As for waste generated by parkway construction, it is assumed that this would be a "balanced" project, meaning that all materials cut from one part of Section 8B would be used as fill elsewhere on the same segment. Failing that, the contractor could use the excess material as fill at nearby construction sites—which would be the least expensive option—or dispose of it at a county or private landfill. It is anticipated that any solid waste that would require disposal as a direct result of this project would not significantly strain local landfill capacities.

Operations period. The amount of solid waste generated by any additional residents or commercial enterprises that might locate in the local area as a result of Section 8B operations, regardless of timing or interchange location, is expected to be easily accommodated by existing solid waste disposal facilities in the impact area.

4.6.3.5 Police and Fire Protection

Construction period. The ability of local police and fire departments to protect public safety is not expected to be noticeably affected by the small number of construction workers that could move to the impact area.

Operations period. It is assumed that GSMNP rangers and seasonal employees would provide protection for parkway visitors and resources, so local police and fire departments would not be required to expend their resources for this purpose. Any slight acceleration in the rate at which relatively low-density residential development occurs in the impact area would likewise have only minimal impacts on local governments' abilities to protect the public safety. However, greater demands for police and fire protection could arise in Pittman Center from the addition of higher-density vacation accommodations, higher-density year-round residences, and commercial facilities—all of which might result from the location of an interchange at Pittman Center Road. Because of the limited size of Pittman Center's police and fire departments, their resources could be strained by the additional demand for services. As with other public service impacts, these would be greatest if Section 8B were opened before Section 8C is completed.

4.6.4 Land Use

Construction period. The major land use changes that would be likely to take place during the construction period would occur on the Section 8B ROW as the roadway itself is constructed. Because NPS currently owns all the land needed for the parkway, no additional property would be acquired. And because the incoming construction work force would be very small, no land outside the existing ROW would be converted to new residential or commercial uses, as is sometimes necessary to accommodate a large work force.

Operations period. Between now and the proposed opening of Section 8B in 2005, tourist traffic in the impact area will continue to grow, and this is likely to stimulate further commercial development along major arteries—particularly U.S. 321—and the demand for new vacation rental units and year-round residences throughout the impact area. Because of Pittman Center's land use plan, its zoning ordinance, and its experience with the Futurescapes project, it is likely that the type and location of new residential units would conform to the community's desired vision for its future development. Along U.S. 321, however, development pressures are likely to be intense and could lead to more—or different types of—commercial establishments than many in the community would prefer. In Cosby, despite the fact that there is neither a land use plan nor a zoning ordinance, it is expected that existing patterns of development would continue because of the traditionally slow pace of land conversion in that community and the desire of many residents to avoid high-intensity commercial development.

While residential and commercial growth is expected to continue regardless of what happens with the Foothills Parkway, the completion of Section 8B could stimulate additional development in Pittman Center, Cosby, and the rural areas in between them. The nature and magnitude of that development would depend to a large extent on where Section 8B's western interchange is located and when the segment is opened to traffic. Should the interchange be located at Pittman Center Road, the community's land use patterns could change substantially, especially if Section 8B were opened before the completion of Section 8C. As mentioned earlier, roughly 1,200 additional

vehicles per day are expected to use Pittman Center Road between the parkway and U.S. 321 if Section 8B is opened in advance of Section 8C. This increase would approximately double the total number of trips along this portion of road and approximately triple the number of tourist trips. This could create significant pressure for high-intensity commercial development in the vicinity of the interchange and could also encourage strip commercial development along Pittman Center Road, southward all the way to U.S. 321. In addition, the presence of substantial numbers of tourists in the heart of Pittman Center could increase the demand for vacation rental units and year-round residences, elevating the attractiveness to local land owners of building higher-density units than is currently allowed. While such development is counter to the future envisioned in the town's consensus land use map and Futurescapes final report and would require changes in the current zoning ordinance, the local government is empowered to make such changes and conceivably might, if the political pressure brought to bear on this issue were sufficient. All other interchange options (i.e., western interchange at or near U.S. 321 and no western interchange at all) would result in substantially less development pressure in Pittman Center, although they would result in a slightly faster rate of relatively low-density residential growth within the community than would occur in the absence of the parkway. Completing Section 8B—regardless of interchange location—would be expected to lead to a slight increase over the no-build alternative's pace of residential growth along the Section 8B ROW, from Pittman Center's eastern boundary all the way to Cosby.

While the Pittman Center Road interchange could encourage the type of intense development described, it also would lessen—to some extent—the no-build alternative's pressure for commercial development along U.S. 321 east of Pittman Center Road by diverting travelers away from that segment of highway. Similarly, locating the interchange at or near U.S. 321 would reduce the pressure for commercial development along U.S. 321 east of Webb Creek Road. And the no-interchange option would lessen development pressure along U.S. 321 between Cosby and Gatlinburg by preventing travelers on the Foothills Parkway from exiting anywhere in the vicinity of Pittman Center.

4.6.5 Taxes

Construction period. Any increase in local property tax revenues received by local governments in the impact area as a result of the immigration of 36 construction worker households would be negligible. However, sales tax revenues would be likely to increase slightly because of the purchase of construction materials by the road contractor and the purchase of consumer goods by construction workers. Assuming that the total cost of construction materials were \$22.5 million (the high end of the range estimated for Section 8D), that these purchases were spread out evenly over a 5-year period (i.e., \$4.5 million per year), and that all purchases were made in a single county, annual sales tax revenues in Sevier County would increase by approximately 0.5% and total revenues would increase by about 0.2%. If all purchases were made in Cocke County, the effect would be greater, with sales tax revenues increasing by roughly 3% and total revenues increasing by approximately 0.6%. Purchases of consumer goods would result in only a very small increase in local sales tax revenues. Assuming that all construction worker households would conform to the national average for consumer expenditures and spend approximately \$20,000 annually on taxable goods and services (U.S. Bureau of the Census 1994) and that all of these purchases would be concentrated in a single county, sales tax revenues in Sevier County would grow by only 0.16% and total revenues would register an even smaller 0.06% rise. In Cocke

County, the projected increase in sales tax and total revenues resulting from construction worker purchases would be 0.98% and 0.17% respectively.

Operations period. Because of ongoing growth and development, tax revenues collected by local governments are expected to increase over time, even in the absence of Section 8B. Should Section 8B be completed, however, residential development in the impact area could be slightly accelerated, probably resulting in a small increase in local property tax revenues and a minor boost in sales tax receipts because of purchases made by new vacationers and year-round residents. These impacts would be expected to be minimal in Cosby and the rural area along the Section 8B ROW because of the small increase in residential development that would be expected. Similarly, tax impacts would be expected to be minor in the Pittman Center community with every interchange except for the one located at Pittman Center Road. As noted earlier, if the Pittman Center Road interchange were constructed, the community's land use patterns could change substantially, especially if Section 8B were opened before the completion of Section 8C. The high-intensity commercial development, strip commercial development, and higher-density residential units that could be built in Pittman Center would result in a greater increase in local property and sales tax revenues than under any other build option or the no-build alternative as a result of the addition of new high-value structures to the community and expanded purchases by tourists and new permanent residents. Such a jump in revenues would tend to bring per capita tax revenues in Pittman Center closer to the levels experienced in the rest of Sevier County.

4.6.6 Economic Structure

Construction period. Any changes to the economic structure of the impact area as a result of Section 8B construction would be minor because of the small number of new jobs that would be created. Even if all 69 construction workers came from Cocke County, that would amount to only 0.4% of the existing labor force. The maximum number of indirect jobs that could be created as a result of construction would represent the same small percentage of the local labor pool. In Sevier County, the new parkway-related construction jobs and indirect employment would each equal only 0.2% of the existing labor force. These small, temporary additions to the labor force would do nothing to alter the basic economic structure of either county.

Operations period. As mentioned earlier, tourist traffic in the impact area is expected to grow with or without the completion of Section 8B, and this is likely to stimulate further commercial development along major arteries—particularly U.S. 321. This commercial development would create some additional jobs, but these would be consistent with the existing economic character of the area and would not be expected to noticeably change local unemployment rates. Should Section 8B be built with an interchange at Pittman Center Road, commercial growth in the Pittman Center area could be stimulated and this would result in additional jobs for area residents. Again, this would not alter the economic nature of Sevier and Cocke counties or substantially decrease area unemployment; but it could represent a substantial change for Pittman Center, which has always been characterized by limited commerce. All other interchange options would result in substantially less development pressure on Pittman Center. And *any* interchange option—including the absence of a western interchange for Section 8B—would lessen the no-build alternative's pressure for commercial development along portions of U.S. 321 by diverting some travelers who would otherwise have used that highway.

4.6.7 Social Structure

Construction period. Any changes in local area population, economic character, and land use patterns that might arise during the construction of Section 8B would be so minor that they would cause no alteration in the social structure of the impact area. It is possible, however, that some people living in the immediate vicinity of the parkway ROW could object to the land disturbance and noise associated with road construction and could be distressed by their anticipation of possible changes to the character of the area arising from parkway operations.

Operations period. Tourist traffic in the impact area would continue to grow for many years to come, regardless of what happens with Section 8B, and this growth is likely to stimulate further commercial development along major transportation arteries, especially in Sevier County. Along U.S. 321, growth pressures are likely to be powerful and could lead to more intensive commercial development than many in the Pittman Center community would prefer. Such commercialization could in turn result in some modification to the traditional character of the community and, at least for some residents, degrade the existing quality of life. To some extent, these impacts could be lessened by operation of Section 8B, which—as explained earlier—would divert some travelers away from U.S. 321 in the vicinity of Pittman Center.

Current residents whose homes are located in close proximity to the Section 8B ROW could experience some negative impacts to their existing quality of life as a result of parkway operations. The major sources of these adverse effects would be the visual changes marking the conversion of previously undeveloped land to a paved parkway, the noise that would accompany automobile traffic on Section 8B, and the possible perception by some that their privacy is being invaded by the presence of tourists near their homes and property. These phenomena could disturb residents who value the current quiet and relative isolation of this area and who might perceive the parkway as an unwanted intrusion. However, the development of a narrow, low-speed parkway designed to afford tourists an opportunity to view the natural beauty of the area is not inconsistent with the low-impact ecotourism that many residents see as the most desirable type of future development for this area.

As explained previously, existing Pittman Center land use patterns could change substantially if the Section 8B interchange were located at Pittman Center Road, especially if Section 8B were opened before the completion of Section 8C. The increased traffic and especially tourist traffic through the heart of Pittman Center could create significant pressure for high-intensity commercial development in the vicinity of the interchange, could encourage strip commercial development along Pittman Center Road, and could stimulate the development of higher-density vacation rental units and year-round residences in the heart of Pittman Center. Such development would alter the existing nature of the community and is counter to the expressed desires of many Pittman Center residents. Accordingly, these changes could have serious negative impacts on the quality of life experienced by many community members. In addition, the heightened development pressures generated by an interchange at Pittman Center Road could lead to conflict within the community concerning future land use, particularly between those who are most attached to the current rural nature of the community and those who stand to reap significant economic benefits from more intensive development.

In Cosby, existing patterns of development are likely to continue, even in the absence of a land use plan and zoning ordinance. Section 8B operation would actually decrease traffic on Cosby's surface roads, and the pace of land conversion in the community has traditionally been slow. Accordingly, there are unlikely to be any noticeable impacts to the local social structure or to the quality of life experienced by local residents, except for the previously mentioned effects that might be felt by those living in the immediate vicinity of the Section 8B ROW.

4.6.8 Environmental Justice

The purpose of an environmental justice analysis is to determine if a proposed project would have disproportionate impacts on poor and minority populations. Table 28 shows that the percentage of minority residents in Cocke and Sevier counties is much lower than in the state of Tennessee as a whole. Only 2.5% of Cocke County's and 1.1% of Sevier County's residents are non-white. In contrast, 17% of the state population is classified as non-white. However, as illustrated in Table 35, Cocke County does have a higher proportion of persons living below the poverty level (25.3%) than does the state as a whole (15.7%). In contrast, only 13.2% of Sevier County's residents have incomes that are classified as being below the poverty level. Because the greatest potential for socioeconomic impacts is in the Pittman Center community, which is located in Sevier County, it appears that low-income residents would *not* be disproportionately impacted by the proposed project. Furthermore, the extremely limited number of minority residents throughout the impact area indicates that this project would not disproportionately affect that population.

4.6.9 Cumulative Impacts

In addition to focusing on the effects of Section 8B construction and operations, the preceding analysis also discusses the growth that is likely to take place as a result of continuing tourism in the impact area. The only other possible sources of cumulative impacts that should be noted are the provision of centralized sewer and water services to Pittman Center and the modification of that community's existing land use regulations to allow greater density of development. If any of these events occurred, additional changes to local population, land use, and social structure could follow.

4.6.10 Summary of Findings

By exposing tourists to the heart of the Pittman Center community—which they would not have seen had they traversed the area along U.S. 321—Section 8B could have the effect of slightly accelerating the demand for vacation accommodations and year-round dwellings that is already anticipated and generally accepted by community members. The presence of Section 8B also could diminish the quality of life for some nearby residents as a result of automobile noise and the visual intrusion of the roadway itself; but the addition of a narrow, low-speed parkway designed to provide tourists with vistas of the GSMNP and surrounding countryside seems compatible with Pittman Center's intention to promote low-impact ecotourism in the community.

A parkway interchange at Pittman Center Road would result in a substantial increase in traffic through the Pittman Center community, especially if Section 8B were opened before completion of Section 8C, which runs westward from Pittman Center to Gatlinburg. With Section 8B open and Section 8C not yet in operation, roughly 1,200 additional daily trips would be expected on Pittman

Center Road between the Foothills Parkway and U.S. 321. This increase would roughly double the total number of vehicles using this stretch of road and triple the number of tourist-related trips. Not only would this change greatly increase surface road traffic through the center of town, but it could create substantial pressure for high-intensity commercial development of the open land close to the interchange and for strip commercial development along Pittman Center Road. It also could encourage the construction of higher-density residential developments—for both tourists and new year-round residents—than is currently allowed. These types of development are incompatible with the vision for the community developed through the recent Futurescapes project, which suggested lower-density residential uses for the areas in question, and would significantly alter local land use patterns and the existing nature of the community. Such an event represents the largest possible socioeconomic impact that Section 8B could have on the study area.

Should Section 8B's western interchange be located at or near U.S. 321 instead of at Pittman Center Road, commercial development in excess of what would occur in the absence of the parkway would not be generated. This would clearly be the case if parkway traffic were released directly onto U.S. 321, because no vehicles would be added to other roads in the Pittman Center community. It would also be true even if traffic were released onto Webb Creek Road. In the latter instance, commercial development would not be stimulated along Webb Creek Road because travelers would have to drive less than 250 m (800 ft) on that roadway to get to U.S. 321, and that entire segment lies on the Foothills Parkway ROW, making it ineligible for private development of any kind.

In Cosby, the site of Section 8B's eastern terminus, the opening of this parkway segment would result in fewer cars along local roads because the parkway would divert some travelers from U.S. 321/SR 32 onto Section 8B, and automobiles going west on Section 8A would have the option of staying on the parkway rather than exiting at Cosby as they currently must. Accordingly, commercial development in the Cosby area would not be expected to be stimulated by the proposed project. However, by exposing tourists to parts of the Cosby area that they might not otherwise have seen, parkway operations could result in a slight acceleration of the current pace at which vacation accommodations and year-round dwellings are being developed. As in Pittman Center, the presence of Section 8B could result in a degradation of the quality of life experienced by some nearby residents.

Socioeconomic impacts in the rural areas between parkway interchanges are expected to be minor because there would be no increase in traffic on surface roadways and hence no stimulus for commercial growth. However, ongoing development of vacation accommodations and year-round residences could be hastened slightly, and some residents could feel that their quality of life is diminished to some extent by the parkway's presence.

4.7 TRAFFIC AND NOISE

In the fall of 1996, ORNL completed an overall traffic study of the entire Foothills Parkway and vicinity. This study is described in Sects. 4.7.1 and 4.7.2 with the results documented in Sect. 4.7.3. The noise analysis results are then discussed in Sect. 4.7.4.

An extensive traffic analysis of the impacts of the proposed Foothills Parkway was performed using the best available traffic information collected from a number of agencies. The proposed Foothills Parkway sections included in the traffic study are Sections 8B, 8C, 8D, and the "missing link" between Sections 8E and 8F in Sevier, Cocke and Blount counties. Rather than just considering the traffic impacts associated with the construction of Section 8B, this study focused on the likely traffic flow patterns resulting from construction of the parkway as a whole. Based on these traffic flow patterns, traffic impacts associated with the construction of Section 8B are assessed.

4.7.1 Traffic Study Area

The area analyzed in the traffic study is illustrated in Fig. 81. The existing highway network for the study is comprised of the following roadway sections:

1. I-40 from west of the intersection with SR 66 (Exit 407) to east of the intersection with U.S. 321 (Exit 440)
2. U.S. 441 from west of Sevierville to south of the intersection with SR 73 in the GSMNP (including the Gatlinburg bypass)
3. U.S. 321 from just north of its intersection with Section 8A in Cosby to just north of its intersection with Section 8G in Walland
4. U.S. 411 from west of Sevierville to the intersection with I-40 in Newport
5. SR 416 from its intersection with U.S. 321 to just north of the intersection with Webb Creek Road
6. SR 32 from the convergence with U.S. 321 at Cosby to approximately 2 miles east of the convergence
7. SR 73 from the intersection with U.S. 321 near Townsend to the intersection with U.S. 441 in the GSMNP
8. SR 66 from the intersection with I-40 (Exit 407) to the intersection with U.S. 441/411 in Sevierville
9. Webb Creek Road (from SR 416 to U.S. 321)
10. Wears Cove Gap Road (from Wears Valley to Metcalf Bottoms)
11. Laurel Creek Road from SR 73 (Townsend Wye) to Cades Cove
12. Little River Road from SR 73 (Townsend Wye) to Elkmont
13. Snider Road (small section at intersection with I-40 at Exit 407 north of Sevierville)
14. Foothills Parkway Sections 8A, 8G, and 8H

4.7.1.1 Data Collection and Acquisition

Intersection traffic volumes. The intersection peak-hour traffic volume information used for this study is based on data from several sources and was collected at different times. Many of these data were collected in traffic studies for Foothills Parkway Sections 8B and 8D. Vehicle turning movement and vehicle classification counts were collected in 1991 for the Section 8D study. Volume, turning movement, and vehicle classification counts were collected in 1994 for the Section 8B study. Other data sources include the NPS and a study by Wilbur Smith Associates published in 1994. A complete listing of intersections for which data were collected is shown in Table 60. The table also includes the location of each intersection and the source of the data. Collection locations are illustrated in Fig. 81.

Table 60. Intersection traffic volume data locations and sources

Intersection	Location	Source	Year
Foothills Parkway Section 8A and U.S. 321	Cosby	<i>Foothills Parkway Section 8B Environmental Report</i> by ORNL	1994
SR 416 and U.S. 321	Pittman Center	<i>Foothills Parkway Section 8B Environmental Report</i> by ORNL	1994
Webb Creek Road and SR 416	Pittman Center	<i>Foothills Parkway Section 8B Environmental Report</i> by ORNL	1994
U.S. 321 and SR 32	Cosby	<i>Foothills Parkway Section 8B Environmental Report</i> by ORNL	1994
Newfound Gap Road and Little River Road	Sugarlands Visitor Center	<i>Foothills Parkway Section 8D Environmental Report</i> by ORNL	1991
U.S. 441 and U.S. 321	Pigeon Forge	<i>Foothills Parkway Section 8D Environmental Report</i> by ORNL	1991
U.S. 321 and SR 73	Townsend	<i>Foothills Parkway Section 8D Environmental Report</i> by ORNL	1991
Townsend "Y"	Townsend	Traffic Count by National Park Service	1994
I-40 and SR 66	Kodak	<i>Sevier Transportation Network Evaluation</i> by Wilbur Smith Associates	1994
SR 66 and U.S. 441	Sevierville	<i>Sevier Transportation Network Evaluation</i> by Wilbur Smith Associates	1994
U.S. 441 and U.S. 321	Gatlinburg	<i>Sevier Transportation Network Evaluation</i> by Wilbur Smith Associates	1994

Roadway section traffic volume. Historical annual average daily traffic (AADT) information was obtained from the TDOT and NPS. The 1994 AADT is presented in Fig. 82. These data were used to adjust 1991 intersection traffic counts to 1994 levels and as a reference for those intersections in the study for which no data were available. Historical data were also used to perform trend analysis in projecting future traffic volumes.

Historical park visitation information was also obtained from NPS. These data were used both in estimating current traffic volumes and in projecting future volumes within the GSMNP.

4.7.1.2 Traffic Study Alternatives

Two alternatives have been considered in assessing potential traffic impacts associated with the construction of Section 8B: a build alternative, which consists of several construction and operational options, and a no-build alternative. It should be noted that other Foothills Parkway

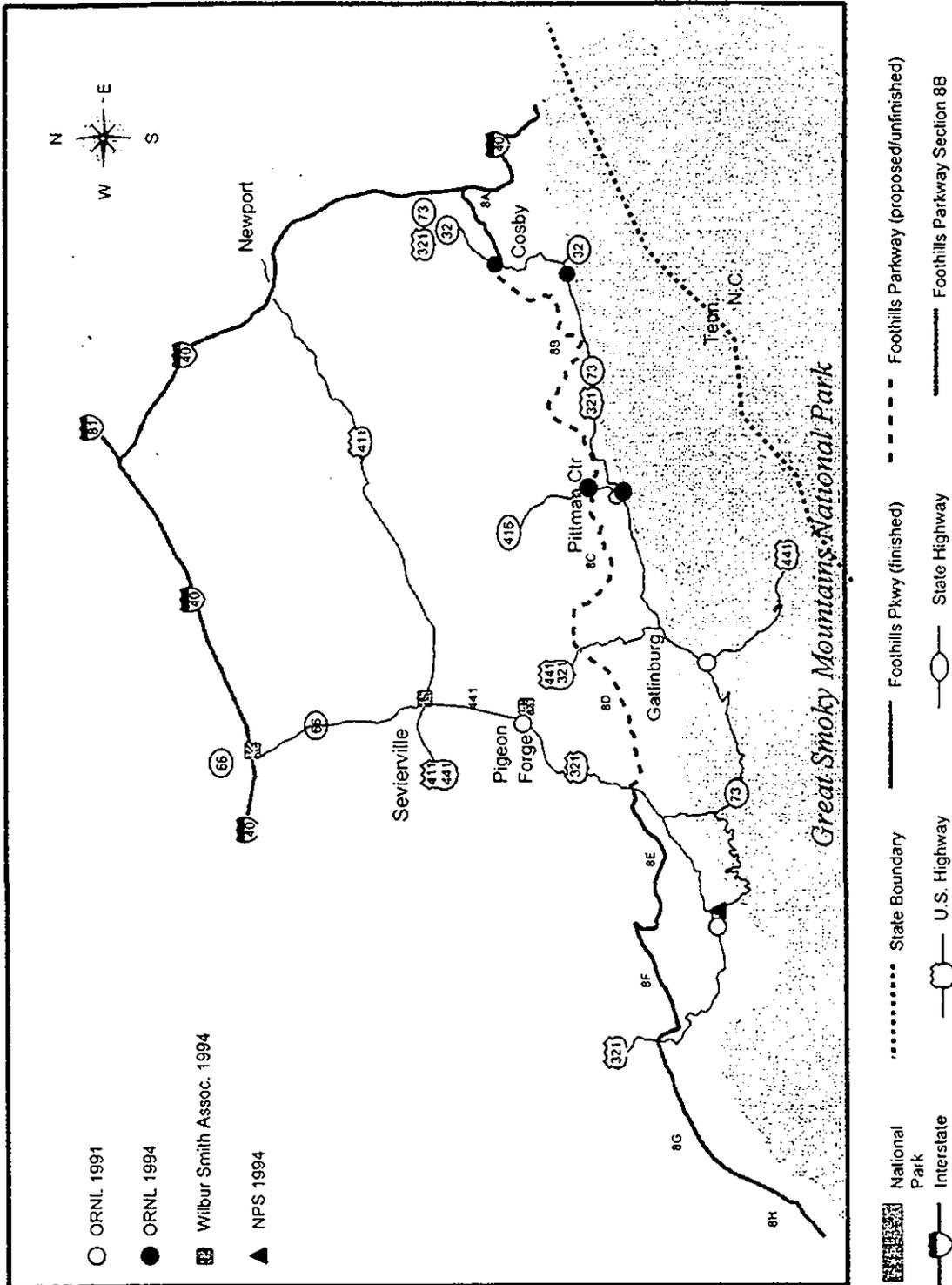
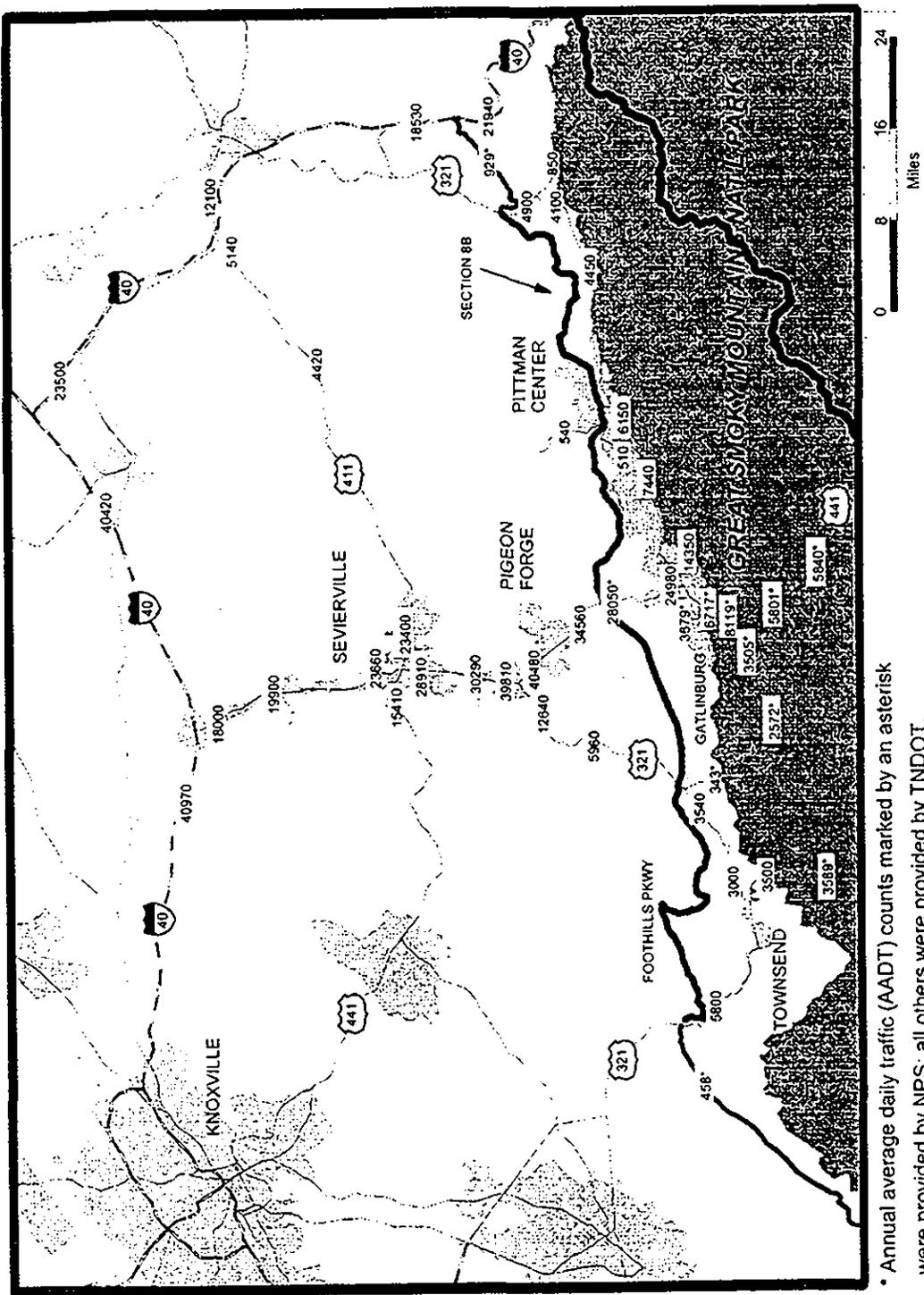


Fig. 81. Location of traffic data counts.



* Annual average daily traffic (AADT) counts marked by an asterisk were provided by NPS; all others were provided by TNDOT.

Fig. 82. Annual average daily traffic—1994 (* AADT from NPS).

sections, such as Section 8C, are included within the traffic network used in forecasting the future traffic flow pattern. However, traffic impacts are assessed only for Section 8B.

Construct Section 8B with No Interchanges

Western Terminus Options

- Foothills Parkway interchange at SR 416 with north ramp connected to Webb Creek Road
- Foothills Parkway interchange at SR 416 with south ramp connected to SR 416
- Foothills Parkway interchange at U.S. 321 with ramp connected to U.S. 321
- Foothills Parkway interchange at U.S. 321 with ramp connected to Webb Creek Road

Operational Timing Options

- Section 8B would be operational prior to the completion of Section 8C with interchange at SR 416.
- Section 8B would be operational prior to the completion Section 8C with interchange at U.S. 321.

No-action

- No-build alternative

For a more detailed description of these alternatives and options, please refer to Sect. 2 of this report. Note that the Webb Mountain option has little effect on the overall traffic flow patterns on the Foothills Parkway; therefore, no traffic impacts have been assessed. For the operational timing options, the traffic study focuses on traffic impacts associated with additional traffic on SR 416 and Webb Creek Road. No traffic impact has been assessed for different ramp configurations.

4.7.2 Future Traffic Projections

4.7.2.1 Applied Methodology

Future traffic volume projections for roadway links within the study area were generated by using historical traffic volume data to determine volume trends and by using the future volumes indicated by these trends in a gravity model to generate future volumes for each link in the highway network. The methodology used to project the future roadway link volumes can be summarized as follows.

1. Define the link-node network

The existing highway network described in Sect. 4.7.1 was coded as a link-node network. A node represents the intersection of two or more roadway sections, and a link represents the roadway section between intersections. The connections of yet-to-be-constructed parkway sections with the existing network vary in accordance with the different alternatives and options.

2. Define the network entry/exit points and assign production and attraction volumes

The entry and exit points of the network were defined, and each was assigned a "production" volume (traffic entering the network) and an "attraction" traffic volume (traffic exiting the network). The traffic volume counts collected (described in Sect. 3.7.1) are used to calculate

the production and attraction volumes for each entry/exit point on the existing network. These include:

- I-81 just north of intersection with I-40
- I-40 just west of intersection with I-81
- I-40 just east of intersection with Foothills Parkway Section 8A
- U.S. 441 just south of intersection with SR 73 in the GSMNP
- U.S. 441/411 just west of Sevierville
- U.S. 321 just north of intersection with Foothills Parkway at Walland
- U.S. 321 just north of intersection with Foothills Parkway in Cosby
- SR 416 just north of intersection with Webb Creek Road
- SR 32 just east of its convergence with U.S. 321 near Cosby
- Snider Road just north of intersection with I-40
- Webb Creek Road just east of intersection with SR 416
- Belz Outlet Mall in Pigeon Forge near convergence of U.S. 441/321
- West end of Foothills Parkway Section 8H

In addition to entry and exit links, sources and sinks along each link in the network were modeled. Sources and sinks represent areas along a link that may attract or produce traffic that does not travel the length of the link. This allows the model to account for traffic entering/exiting shopping centers, residential areas, motels and campgrounds, large parking areas, and other places.

3. Use a gravity model to develop an origin-destination traffic volume matrix for the network

A gravity model was used to develop a matrix of traffic volumes between each production and attraction pair (i.e., origin and destination pair). This model was then calibrated so that the assigned traffic matched, as closely as possible, the observed counts along each link of the network.

4. Generate future production and attraction traffic volume growth factors

The growth factors were used to estimate the future production and attraction volumes. It was assumed that future traffic patterns would remain much the same for the time of the study period (i.e., through 2006 until 2026).

5. Apply the future production and attraction volumes to the gravity model to generate future traffic volumes

A new matrix was generated by the gravity model using the production and attraction volumes for the years 2006 and 2026. These volumes were then applied to the network configuration that corresponds to each alternative and the various options that apply.

6. Diverting traffic to the proposed Foothills Parkway sections

It was assumed that the proposed Foothills Parkway would function solely as a scenic parkway; that is, the proposed sections would not give motorists any travel time advantage over the existing roadway network. Therefore, motorists would travel on the parkway only to experience its scenic beauty. This implies that no existing local traffic would use the proposed Foothills Parkway as a "short cut" between two locations. In light of this assumption, ORNL used a traffic diversion model to estimate existing traffic flow on the parkway and adjusted other traffic volumes accordingly. In doing this, it was assumed that only GSMNP traffic and tourist-related traffic destined to and originating from Sevierville, Pigeon Forge, and Gatlinburg would divert to the parkway. (As traffic increases and the LOS deteriorates on

existing roadways, some local traffic may be diverted to the Foothills Parkway. Because of lack of information on local traffic flow patterns in the study area, the diversion of the local traffic onto the Foothills Parkway has not been quantified; however, it is believed that the diversion of local traffic onto the parkway would be relatively low.)

4.7.2.2 Future Infrastructure Changes

In performing capacity analysis, data describing the geometrical aspects of the transportation network are essential. Changes to the transportation network structure (i.e., addition or demolition of highway sections) must be considered in routing future traffic. The TDOT was contacted in order to discern any planned changes to the transportation network in the study area within the time frame of the study. According to TDOT, two modifications to the highway system are planned for the future: (1) in Sevier county, 9.3 km (5.8 miles) of U.S. 321 from Rattlesnake Hollow to SR 416 (from Gatlinburg to Pittman Center) will be widened to five lanes and (2) in Cocke county, 11 km (6.8 miles) of U.S. 321 (in Cosby) will be widened to four lanes along its convergence with SR 32. It is assumed that these construction projects will be completed by 2006. Since these changes would affect capacity only and would not affect routing, they were considered only in the capacity analysis.

The existing I-140 connects U.S. 70/U.S. 11 (Kingston Pike) to U.S. 129 (Airport Highway). Currently, construction is under way to connect I-140 to I-40 and U.S. 162 (Pellissippi Parkway) to the north. In the meantime, TDOT plans to extend I-140 from U.S. 129 to U.S. 321 in Maryville (Blount County). The schedule of the I-140 southern extension from U.S. 129 to U.S. 321 in Maryville has not been determined. This study, however, assumes that the I-140 southern extension from U.S. 129 to U.S. 321 in Maryville would be completed later than 2006 but earlier than 2026. This study also assumes that the completion of the I-140 southern extension would provide people in the greater Knoxville area with a better alternative route to the study area compared with the route using I-40. Thus, 10% of the greater Knoxville area traffic from I-40 would be diverted to U.S. 321 in Maryville in year 2026.

4.7.2.3 Projecting Future Traffic Production and Attraction Growth

Trend analyses of historical park visitation and traffic volume data were used to project future production and attraction volumes. It was assumed that future traffic patterns would remain much the same for the time of the study period (i.e., through 2006 until 2026).

Different historical data were used to project future traffic volumes for various entry/exit links. Volumes for entry/exit links within the GSMNP were projected using historical recreational visitation information for the park from 1960 to 1993. These data and the ORNL projection are presented in Fig. 83. It should be noted that the park's procedure for estimating recreational visitation information has been modified since 1960. However, because of the long-range nature of the forecasts involved in this study—approximately 30 years into the future—the counting procedure modifications can be viewed as one of the inherent fluctuations dictated by other factors, such as economics and availability of gasoline. This was taken into consideration during the forecast model identification and development stages.

GSMNP Visitation: Historic and Projected

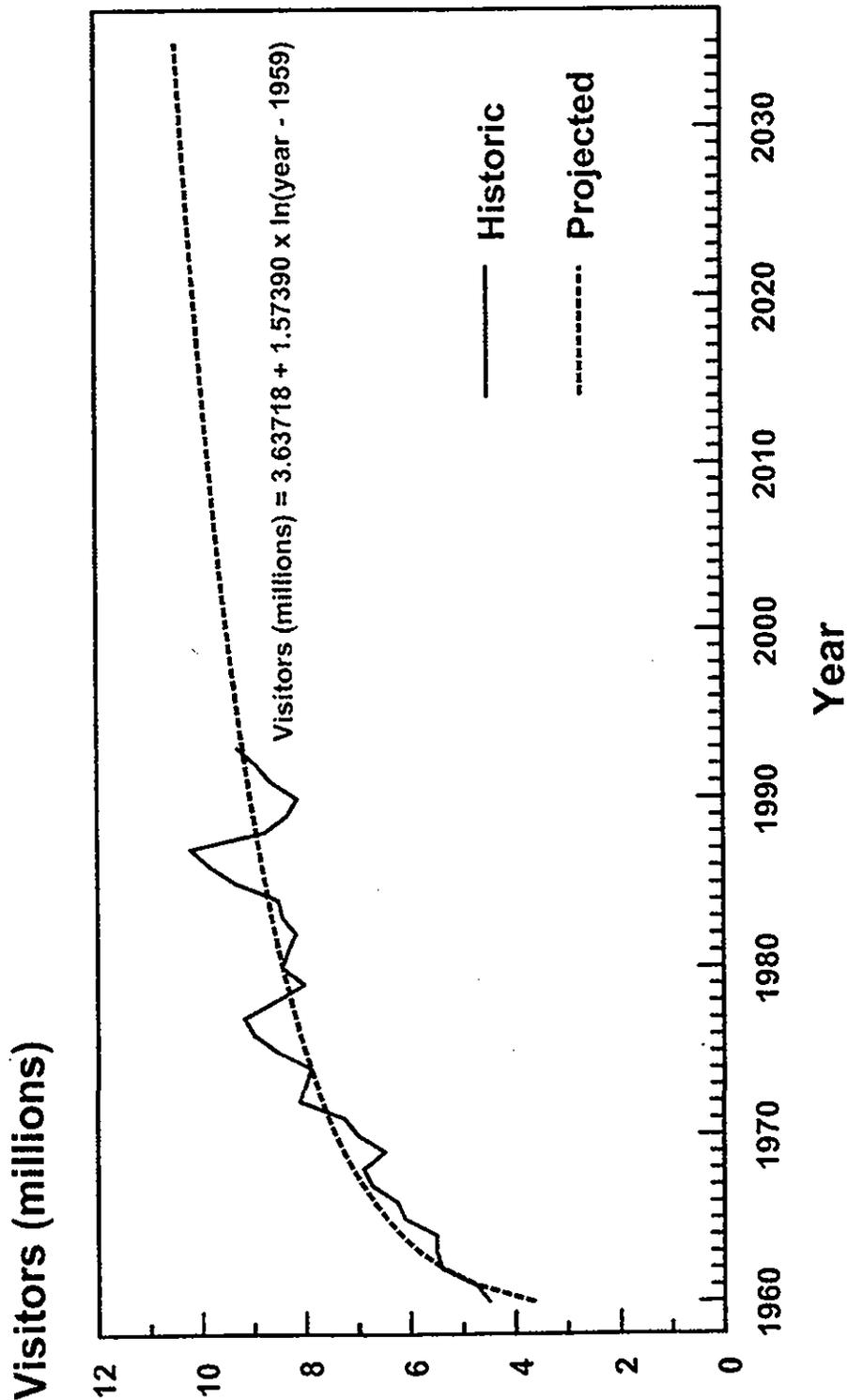


Fig. 83. Great Smoky Mountains National Park historic and projected recreational visitation.

The annual recreational visitation reached over 4 million persons during 1960 and continued to grow during the following decade. The visitation reached over 8 million persons in 1972, continued to increase to over 10 million by 1987, and dropped to 8.1 million by 1990. The visitation increased steadily after 1990, reaching 9.3 million by 1993. The 1994 visitation, however, reversed the recent trend and dropped slightly. This is mostly because of the temporary closure of the Little River Road in the park after the 1993–1994 winter storm. Based on the historical annual park recreational visitation trend, the future park visitation would most likely level off.

A logarithmic linear regression forecasting model has been developed to estimate future recreational visitation based on the historical visitation data. Because of the historical visitation trend, the limited additional capacities of the surrounding highways that lead into the park, and the limited capacity of the park's facilities, it is projected that recreational visitation at the park would level off at approximately 9.66 million in 2006 and approximately 10.23 million in 2026 (± 1.5 million for each estimate). These recreational visitation forecasts translate into a 4.1% increase in 1993 traffic by the year 2006 and a 10% increase by the year 2026 (Fig. 83).

Future traffic volume projections for other roadways within the study area were generated by determining historical traffic volume trends and applying these trends to current conditions. Volume trends were determined by applying a least square error technique to historical data from 1987 to 1994. In some cases, the trends were calculated for the sum of the volumes on multiple links within an area. This method was used because it resulted in less year-to-year fluctuation in volume. Historical and projected traffic volume trends are illustrated in Figs. 84 and 85, respectively.

The production and attraction volumes for the entry/exit point on Foothills Parkway Section 8A were estimated by applying the projected GSMNP park visitation growth factor to the 1994 traffic volume. On Section 8A, it was estimated that a 4.1% increase over its 1994 traffic would occur by the year 2006 and a 10% increase would occur by the year 2026.

4.7.2.4 Determining Traffic Diversion to the Foothills Parkway

As mentioned above, the Foothills Parkway is envisioned solely as a scenic parkway. The proposed speed limit is assumed to be 30 miles per hour. Because of the winding nature of the roadway and the low speed limit, it is unlikely that the proposed Foothill Parkway would be used by the public as an alternative route to save travel time. Thus, traffic on the proposed Foothills Parkway would be primarily focused on the scenic aspect of the parkway. This is consistent with the National Park policy that the Foothills Parkway is an integral part of the GSMNP and is not intended for commercial and local traffic. In reality, a portion of the local traffic would use the parkway to move around local areas as traffic on existing roadways increases and as LOS deteriorates in the future. Because of lack of information on local traffic flow patterns in the study area, the diversion of the local traffic onto the Foothills Parkway has not been quantified. However, it is believed that the diversion of local traffic onto the parkway would be relatively low. It is further assumed that only traffic related to GSMNP and other tourist-related traffic would be attracted by the scenic aspect of the Foothills Parkway. Thus, a traffic diversion method was used to estimate the future traffic volumes on it. This method involved the following two steps.

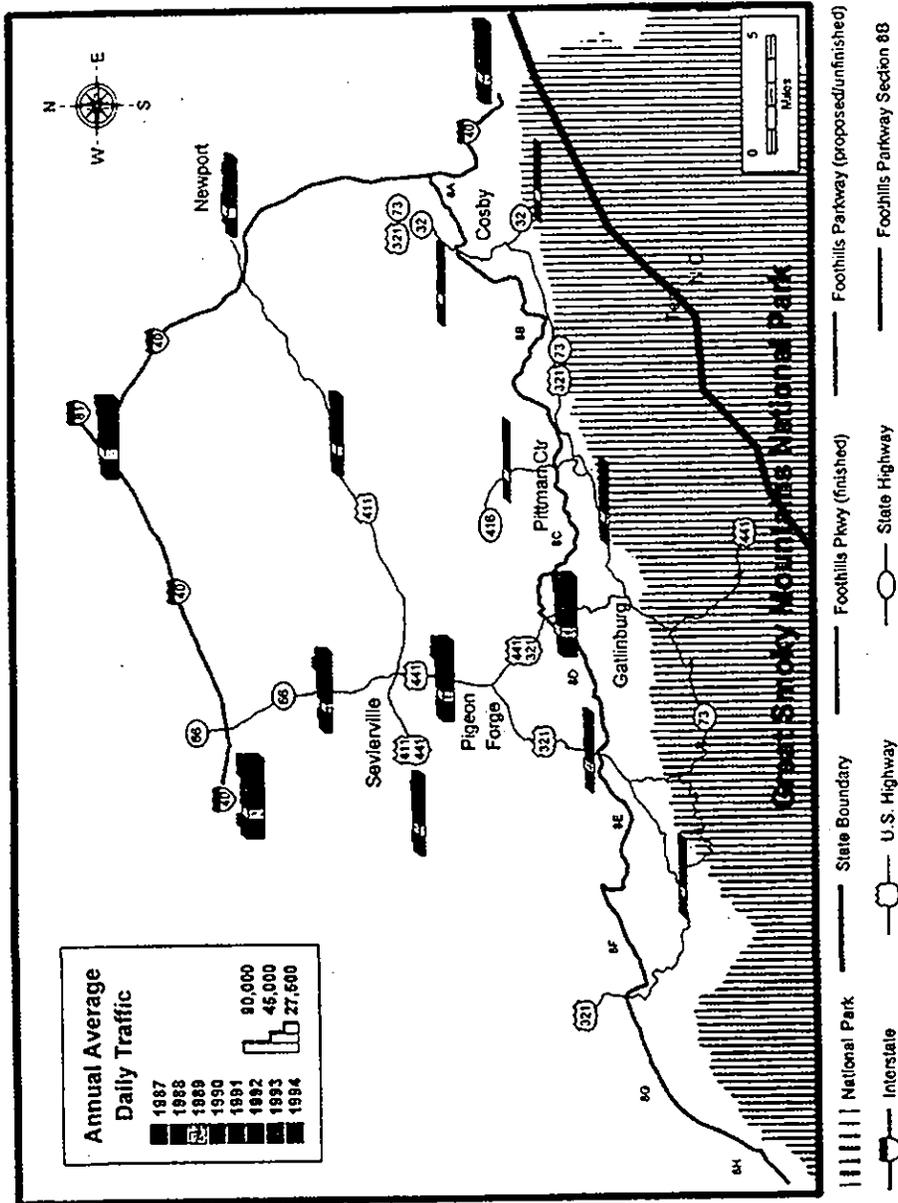


Fig. 84. Historical traffic trends: 1987 to 1994.

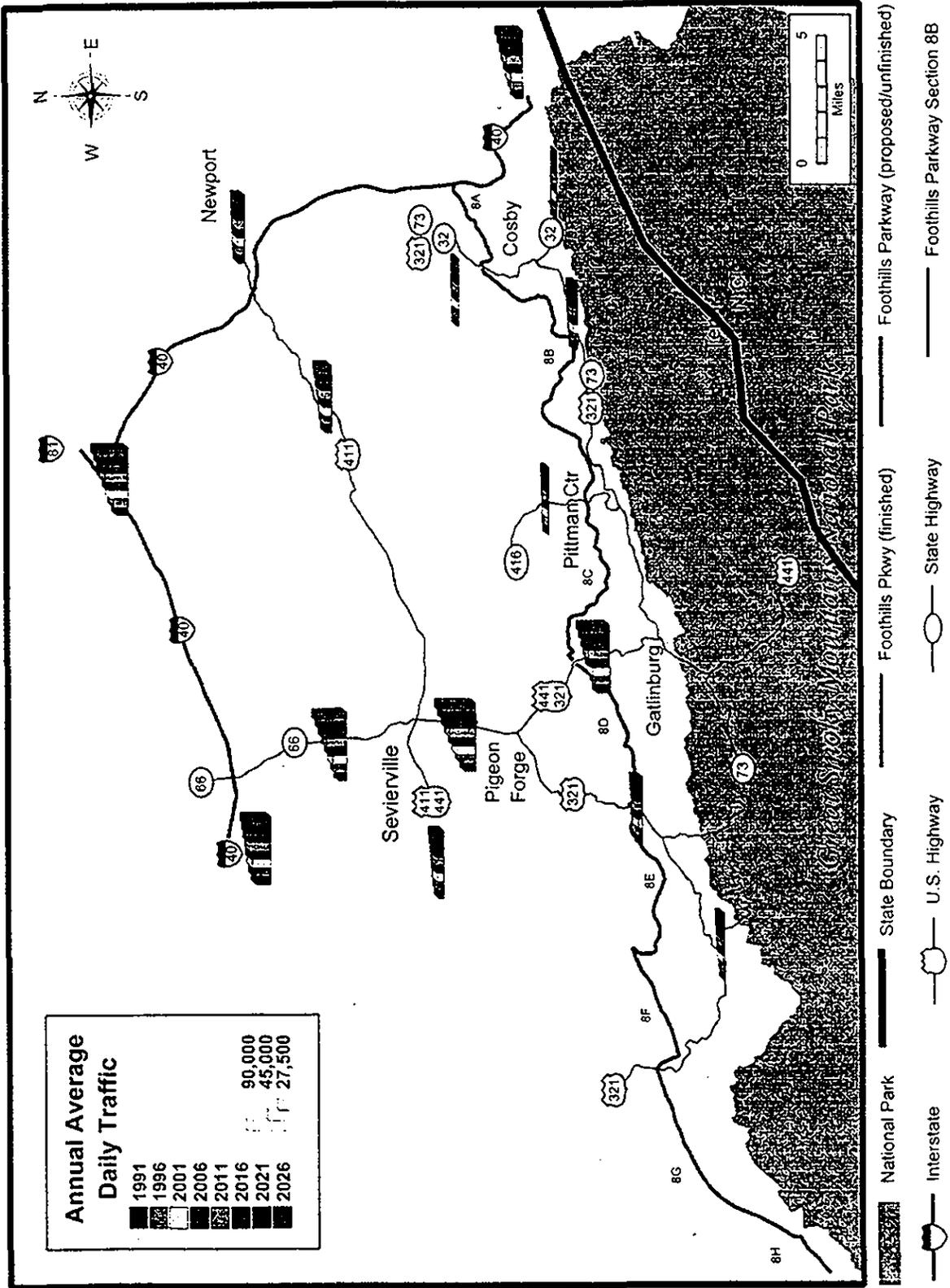


Fig. 85. Traffic growth projections: 1991 to 2026 in five-year intervals.

1. Identify the links parallel to Foothills Parkway

The first step in determining traffic diversion was to identify the links from which tourist-related traffic might divert to the parkway. These links mostly consist of those highway sections that run parallel to the parkway (Table 61).

Table 61. Roadways parallel to the Foothills Parkway

Foothills Parkway sections	Parallel roadways
Section B	U.S. 321 between SR 416 and SR 32 U.S. 411 between SR 92 and I-40
Section C	U.S. 321 between Proffit Road and SR 416
Section D	U.S. 321 in Wear Valley Little River Road in the GSMNP
Sections E and F	U.S. 321 between Walland and Townsend

2. Identify potential traffic for diversion

The next step was to identify the kinds of traffic that would divert to the parkway. As stated above, this was assumed to consist strictly of tourist-related traffic. Thus, traffic within the study area was divided into four categories: GSMNP-related, primary tourist-related, secondary tourist-related, and other. The GSMNP, primary and secondary tourist-related traffic was diverted to the applicable parkway sections. Other traffic, such as local and pass-through traffic, was not diverted by the model. For each parallel highway section, a percentage of tourist-related traffic was diverted to the parkway. The percentage for each section was based on the origin and destination locations. Tourist-related highway traffic and their diversion percentages are displayed in Table 62.

Table 62. Diversion factors for various origins and destinations

Origin and destination	Traffic type	Diversion factors
Cades Cove Elkmont Newfound Gap Road	GSMNP-related traffic	50%
Gatlinburg Pigeon Forge	Primary tourist-related traffic	20%
Townsend Fringe Area of Pigeon Forge Fringe Area of Gatlinburg	Secondary tourist-related traffic	10%

After the described diversion procedure was applied, the resulting link volumes were calculated and capacity analysis was performed.

4.7.3 Traffic Study Results

Based on the methodology discussed in Sects. 4.7.1 and 4.7.2, future traffic volumes for the two alternatives and subsequent options have been projected for the years 2006 and 2026. The levels of service for roadways within the study area have been determined for the morning and afternoon peak periods for the weekday and weekend peaks for each alternative and associated options for both 2006 and 2026. These data are quite voluminous. Therefore, traffic volumes for each roadway are given in Appendix J of this document.

Almost all of the intersections within the study area would involve construction or reconstruction in the future. Intersections of Section 8A and U.S. 321 in Cosby, and SR 416 and Webb Creek Road in Pittman Center would be replaced by interchanges for Sections 8A, 8B, and 8C with U.S. 321 in Cosby and SR 416 in Pittman Center. Under certain build options, new intersections between the Section 8B ramp with Webb Creek Road or U.S. 321 near Pittman Center would be built. The convergence of U.S. 321 with SR 32 and the intersection of U.S. 321 with SR 416 would be affected by TDOT's planned widening of U.S. 321 to four lanes in Cosby and Gatlinburg. It is assumed that these intersections would be designed and built to maintain adequate levels of service. Therefore, LOS for these intersections was not predicted in this study.

4.7.3.1 Construct Sections 8B and 8C with no Interchanges

For 2006: In general, proposed Section 8B would alleviate the traffic on U.S. 321 because (1) Section 8B is parallel to U.S. 321 from Cosby to Pittman Center and (2) a portion of the tourist-related traffic from U.S. 321 would use Section 8B. Consequently, U.S. 321 from Cosby to Pittman Center should experience a better LOS in 2006 with the construction of Section 8B. Sections of U.S. 321 with four lanes would operate at LOS B in 2006. Two-lane portions of U.S. 321 would experience LOS D in 2006 under this build option.

SR 416 would still operate at LOS B in 2006 since proposed Section 8B and 8C would have no interchange at Pittman Center and therefore no traffic entering or exiting the parkway at this location.

Traffic on proposed Section 8B would be moderate in 2006, operating at LOS C.

Based on the projected future traffic on U.S. 321, SR 416, and the Foothills Parkway in 2006, it can be concluded that the construction of Section 8B would not have significant traffic impact on the surrounding roadway under this build option.

For 2026: Although projected traffic volumes would increase between 2006 and 2026, the LOS ratings along many roadway sections would remain the same as in 2006. Only one section of roadway would exceed an acceptable LOS, and none would exceed the levels of service predicted for the no-build alternative.

Levels of service on all sections of U.S. 321 would degrade from 2006 conditions by one LOS category on weekends as would the section west of SR 416 on weekday mornings. Only the section of U.S. 321 from SR 416 to the convergence with SR 32 in Cosby would reach unacceptable levels of congestion (LOS E) on weekends under this build option. However, this is

the same LOS predicted for the no-build alternative. Traffic on U.S. 321 west of SR 416 would experience slightly less traffic and a better LOS (C) on weekends than it would with the no-build alternative (LOS D).

Levels of service on SR 416 would remain at LOS B in 2026 and would experience no significant growth in traffic volumes.

Levels of service along Section 8B would remain the same from 2006 to 2026, except for weekday mornings, which would decrease from LOS B to LOS C.

4.7.3.2 Western Terminus Options

The western terminus options incorporate the timing option for Section 8B being constructed but not opened until Section 8C is complete. The timing option for Section 8B being constructed and put into operation before the completion of Section 8C is discussed later in Sect. 4.7.3.3.

Interchange at SR 416 with north ramp connected to Webb Creek Road for 2006. In this build option, the proposed parkway would have an entrance and exit ramp connecting to the existing T-intersection of SR 416 and Webb Creek Road. Because most of the Section 8B traffic would continue to and from Section 8C, the exiting and entering traffic on the northern ramp would be low. Thus, the traffic flow pattern under this option would be similar to the traffic flow pattern under the no-interchange option. The traffic on SR 416 would increase only slightly in 2006. This minor traffic increase on SR 416 would have no impact on LOS. SR 416 would still operate at LOS B in 2006 under this option. The traffic on U.S. 321 would decrease slightly in 2006, but U.S. 321 would still operate at the same LOS as in the no-interchange option (Sect. 4.7.3.1).

Under this option, the northern ramp of the parkway would connect to the existing T-intersection of SR 416 and Webb Creek Road. This configuration would require reconstruction of the existing intersection. It is assumed that the future intersection would be designed and built properly so that it would operate at an acceptable LOS.

A location has conflicting traffic when different traffic flows would like to use the same roadway facility at the same time. The best example of conflicting traffic is traffic at an intersection. For conflicting traffic, traffic control devices such as traffic signals or stop signs are needed to alternate the ROW to each conflicting traffic stream. The advantage of the northern ramp option is that it channels the added conflicting traffic to an existing intersection. Thus, the added conflicting traffic from the parkway would be consolidated with existing conflicting traffic. Any existing and future traffic problems could be resolved by the planned future reconstruction of the intersection.

Based on the projected future traffic on U.S. 321, SR 416, and the Foothills Parkway in 2006, it can be concluded that the construction of Section 8B under this option would not have significant traffic impact on the surrounding roadway.

Interchange at SR 416 with south ramp connected to SR 416 for 2006. The difference between this option and the north ramp option is that the entrance and exit ramp for the parkway would be connected to SR 416 south of the Webb Creek Road intersection. As stated previously, traffic on

the ramp would be light. This study assumes the future intersection of the parkway and SR 416 would be designed and built properly so that the new intersection would operate at an acceptable LOS.

In general, the traffic on all roadways near Section 8B would have the same traffic pattern as in the north ramp option in both 2006 and 2026. Thus, construction of Section 8B would not have a significant impact on the traffic on surrounding roadways under this option.

Interchange at SR 416 (both ramp options for 2026). Although traffic volumes would increase between 2006 and 2026, the LOS rating along most roadway sections would remain the same as in 2006. Only one section of roadway would exceed an acceptable LOS, and none would exceed the levels of service predicted for the no-build alternative.

Levels of service on all sections of U.S. 321 would remain the same as in 2006 during weekday peak periods but would degrade by one LOS category during weekend peaks. Only the section of U.S. 321 from SR 416 to the convergence with SR 32 in Cosby would reach unacceptable levels of congestion (LOS E) on weekends. However, this is the same LOS predicted for the no-build alternative.

Levels of service on SR 416 would remain at 2006 levels (LOS B) and would experience no significant growth in traffic volumes.

Traffic on Section 8B would continue to operate at LOS C in 2026 under this option.

Interchange at U.S. 321 with ramp connected to U.S. 321 for 2006. The difference between this option and the SR 416 north and south ramp options is that the entrance and exit ramp for the Foothills Parkway would be connected to U.S. 321 directly. Traffic would not travel through Pittman Center via SR 416. This study assumed the future intersection between the parkway and U.S. 321 would be designed and built properly so that it would operate at an acceptable LOS.

Since most of the Foothills Parkway traffic would remain on Section 8C, the entering and exiting traffic from the Foothills Parkway on this ramp would be light in 2006. Only a very small portion of the traffic on SR 416 would be diverted to U.S. 321 in 2006. Therefore, the traffic on all roadway segments near the Section 8B area would have the same traffic pattern as in the SR 416 north and south ramp options. Therefore, it can be concluded that the construction of Section 8B would not significantly affect traffic on the surrounding roadway under this option.

Interchange at U.S. 321 with ramp connected to Webb Creek Road for 2006. The difference between this option and the other U.S. 321 ramp option is that the Foothills Parkway entrance and exit ramp would be connected via Webb Creek Road to U.S. 321. The advantage of this ramp configuration is that it would channel the added conflicting traffic to an existing intersection. Any existing and future problems can be resolved by the future reconstruction of the intersection.

The intersection between the Foothills Parkway ramp and Webb Creek Road would be built and the existing intersection between Webb Creek Road and U.S. 321 would be reconstructed. This study assumes the future intersections would be designed and built so that the new intersection and reconstructed existing intersection would operate at an acceptable LOS.

The traffic on all parkway segments near the Section 8B study area would have the same traffic pattern as with the direct connection to U.S. 321 in both 2006 and 2026. Therefore, it can be concluded that the construction of Section 8B would not significantly impact traffic on surrounding roadways under this option.

Interchange at U.S. 321 (both ramp options for 2026). Although traffic volumes would increase between 2006 and 2026, the LOS rating along most roadway sections would remain the same as in 2006. Only one section of roadway would exceed an acceptable LOS, and none would exceed the levels of service predicted for the no-build alternative.

Levels of service on all sections of U.S. 321 would remain the same as in 2006 during weekday peak periods but would degrade by one LOS category during weekend peaks. Only the section of U.S. 321 from SR 416 to the convergence with SR 32 in Cosby would reach unacceptable levels of congestion (LOS E) on weekends. However, this is the same LOS predicted for the no-build alternative.

Levels of service on SR 416 would remain at 2006 levels (LOS B) and would experience no significant growth in traffic volumes.

Traffic on Section 8B would operate at LOS C in 2026 under this option.

4.7.3.3 Operational Timing Options

The discussion in this section will concern only those timing options where Section 8B would be operational prior to Section 8C being completed. The scenarios that would occur if Section 8B were not opened until Section 8C was completed are discussed in Section 4.7.3.2 in conjunction with the Western Terminus Options.

Section 8B operational prior to the complete Section 8C with interchange at SR 416 for 2006. In this option, Section 8B would be built and operational before the completion of Section 8C. All traffic on Section 8B would have to enter and exit using the ramp in Pittman Center via SR 416. Thus, all Section 8B traffic would use SR 416. This translates into an increase of traffic on SR 416 of approximately 85% over the no-build alternative (Section 4.7.3.6). The LOS would be C compared with B for the no-build option in 2006. This is still an acceptable LOS.

The traffic on Section 8B would be diverted to U.S. 321 from SR 416 outside of Gatlinburg. Consequently, U.S. 321 from SR 416 to near Gatlinburg would operate at LOS C in 2006.

Although two roadway segments would experience lower LOS in 2006 under this option, both of them would still operate at an acceptable LOS. Therefore, it can be concluded that the construction of Section 8B under this alternative would not have a significant traffic impact on the surrounding roadways.

Interchange at SR 416 (both ramp options for 2026). Traffic conditions under this timing option would be similar to those that would occur if Section 8B were not opened until after 8C was completed (see Sect. 4.7.3.2). This option would have no effect on levels of service on the

sections of U.S. 321 east of SR 416 or on Section 8B. The section of U.S. 321 west of SR 416 and the southern end of SR 416 would generally experience LOS one category worse than if Section 8B was not opened prior to the completion of 8C. Like the western terminus option, the section of U.S. 321 from SR 416 to the convergence with SR 32 in Cosby would reach unacceptable levels of congestion (LOS E) on weekends in 2026. However, this is the same LOS predicted for the no-build alternative. All other roadway sections would operate at acceptable levels.

Compared to the no-build alternative, traffic conditions would operate at essentially the same LOS, except along SR 416 in 2026. Levels of service on SR 416 would generally operate at one LOS category worse than for the no-build scenario. Still, traffic conditions would be acceptable along this roadway section.

Section 8B operational prior to the complete Section 8C with interchange at U.S. 321 for 2006. All traffic on Section 8B would have to enter and exit using the ramp connected to U.S. 321 near Pittman Center or the ramp connected to Webb Creek Road. All Section 8B traffic would use U.S. 321. Traffic on SR 416 would not be affected under this option.

The traffic on Section 8B would be diverted to U.S. 321 from SR 416 outside of Gatlinburg. Consequently, U.S. 321 from SR 416 to outside of Gatlinburg would operate at LOS C in 2006.

Interchange at U.S. 321 (both ramp options for 2026). Traffic conditions under this timing option would be similar to those that would occur under the U.S. 321 interchange option if Section 8B were not opened until after 8C was completed (see Sect. 4.7.3.2). This option would have no effect on levels of service on the sections of U.S. 321 east of SR 416 or on Section 8B. The section of U.S. 321 west of SR 416 and the southern end of SR 416 would generally experience LOS one category worse than if Section 8B was opened after 8C was complete. Thus, it would experience LOS C during the weekday peaks and LOS D on weekends in 2026. Like the other option, the section of U.S. 321 from SR 416 to the convergence with SR 32 in Cosby would reach unacceptable levels of congestion (LOS E) on weekends in 2026. However, this is the same LOS predicted for the no-build alternative. All other roadway sections would operate under acceptable levels.

Compared to the no-build alternative, traffic conditions would operate at essentially the same LOS, except along U.S. 321 west of SR 416 in 2026. Levels of service on this section of roadway would generally operate at one LOS category worse (LOS C) than for the no-build scenario during the weekday peaks but would remain at the same LOS (D) as the no-build scenario during weekends. Still, traffic conditions would be acceptable along this roadway section.

4.7.3.4 Traffic Impacts Due to Construction

The lack of a detailed engineering plan and construction schedule limits the assessment of traffic impacts from construction of Section 8B. Therefore, the traffic impacts associated with construction are described only in general terms.

There are no estimates of the workforce required to complete the construction of Section 8B during the peak construction period. However, it is assumed that it would not exceed the peak

workforce of 69 persons required for the construction of Section 8D (Sect. 4.6.1). Therefore, traffic generated by commuting construction workers would not have a significant effect on existing traffic. Trucks hauling construction-related materials would also have little effect on the level of service of local roads. However, the use of heavy trucks would significantly reduce the remaining service life of the pavement on these roads. Because a construction-related heavy-truck circulation plan has not yet been developed, it is uncertain which local roads would be affected.

4.7.3.5 Cumulative Effects of All Sections Open to Traffic

If all sections of the Foothills Parkway were open to traffic, the traffic pattern in the study area (from Cosby to Pittman Center) would be similar to the traffic pattern with Sections 8B and 8C open to traffic. It is estimated that no more than an additional 500 vehicles per day or 10 vehicles per peak-hour through traffic would travel between Sections 8C and 8D since the traffic within the area is mostly tourist-related. The tourist-related traffic is heavily concentrated on U.S. 441 between Sevierville, Pigeon Forge, and Gatlinburg. The highest traffic volume on this corridor exceeded 4,000 vehicles per hour during the peak hour in 1994. This heavily traveled corridor, however, is not parallel to the proposed Foothills Parkway; thus it is not expected that much of this tourist-related traffic would be diverted to the proposed Foothills Parkway. U.S. 321 is parallel to Sections 8B, 8C, 8D, 8E and 8F of the proposed Foothills Parkway. Traffic on U.S. 321 ranges from 870 to 1,700 vehicles per hour and is relatively light compared with the traffic on U.S. 441. Thus, it is estimated that there would be no major cumulative increase in traffic with all segments of the Foothills Parkway open.

4.7.3.6 No-Build Alternative

For 2006: Traffic would continue to increase on U.S. 321 from Cosby to Pittman Center to 2006. The traffic growth rates on U.S. 321 within the Section 8B area would range from 20% to over 40%. The existing traffic on SR 416 from Webb Creek Road to U.S. 321 would be light compared with traffic on U.S. 321. However, the traffic growth rate would be close to 200% on SR 416 to 2006. Despite high growth, traffic on SR 416 would still operate at LOS B in 2006.

As mentioned before, two modifications to U.S. 321 are planned by TDOT for the future: (1) in Sevier county, 9.3 km (5.8 miles) of U.S. 321 from Rattlesnake Hollow to SR 416 (from Gatlinburg to Pittman Center) would be widened to five lanes and (2) in Cocke county, 11 km (6.8 miles) of U.S. 321 in Cosby would be widened to four lanes along its convergence with SR 32. These segments of U.S. 321 would operate at LOS B in 2006. The two-lane segment of U.S. 321 from the convergence of SR 32 to SR 416 would experience LOS E in 2006 without the construction of Section 8B.

For 2026: By 2026, conditions on U.S. 321 between SR 416 and the convergence with SR 32 in Cosby would continue to operate at an unacceptable LOS on weekends but would not degrade beyond LOS E. Conditions on U.S. 321 west of SR 416 would generally degrade by one LOS category by 2026. Traffic volumes on U.S. 321 north of the convergence with SR 32 would increase, causing weekend levels of service to degrade from LOS B to LOS C.

Traffic volumes on SR 416 would increase modestly and remain at LOS B during all peak periods.

4.7.3.7 Bicycle Traffic

Foothills Parkway Section 8B is proposed as a scenic roadway used primarily for auto touring. Bicycling, however, is an increasingly popular activity, making it important to determine how much bicycling traffic might occur on Section 8B if constructed. At present, there is no standard, accepted method for modeling bicycle traffic flow along roadways or estimating activity levels in a given area. Therefore, ORNL estimated usage, in a very general sense, based on the suitability of Section 8B for cycling. In doing so, ORNL compared the physical characteristics of Section 8B with the "bike-way" characteristics desirable to two kinds of users, (1) casual users and (2) enthusiasts (i.e., those who are advanced bicyclists or consider bicycling a hobby), to evaluate how attractive Section 8B would be to each user type. The analysis indicates that the parkway, as designed, is not well suited for either user type and is unlikely to receive significant bicycle use.

Most of Section 8B would be built on mountainous terrain and, based on analysis of the current roadway design profile, would contain many steep uphill and downhill slopes. From Pittman Center to Cosby, the roadway slopes downward for 49.5% of its length and upward for 50.5%. About two-thirds (65.6%) of the downward sloping mileage and 60.2% of the upward sloping mileage have grades in excess of 5%. Thus, overall, 14.3 km (8.9 miles) of Section 8B would have a slope in excess of 5% grade, and a bicyclist would have to traverse more than 7 km (4 miles) of steep up-hill slopes in excess of 5% grade from either Pittman Center or Cosby. Bicycling these slopes would be physically challenging, which would deter many potential bicyclists.

The California Department of Transportation (CDOT) Highway Design Manual (one of the few available manuals containing bikeway design criteria) Section 1003.3, paragraph (12), recommends that the maximum grade for bike paths be 5%. If a wide range of riders is to be accommodated, it suggests that sustained grades be limited to 2%, although steeper grades can be tolerated for short sections [e.g., up to about 150 m (490 ft)] (CDOT 1995). In its assessment, ORNL staff have applied these criteria as those sought by cyclists in choosing a place to ride. The physical characteristics of Section 8B differ markedly from the California State Department of Transportation bikeway design criteria, especially in terms of the grade requirements for use by "a wide range of riders." This suggests that casual riders, or non-enthusiasts, would be unlikely to use the Section 8B due to its physically demanding ascents. Furthermore, since parkway grades typically exceed 5% for long sections, this criterion suggests that use by enthusiasts might also be limited.

In order to better understand the potential usage by enthusiasts, NPS and ORNL staff met informally with members of several biking organizations in the Knoxville area on October 2, 1997. Most cyclists at the meeting described current bicycle use as heavy in the Knoxville area, but use near the park was significant only on select routes. Most cyclists at the meeting felt that local and park roads surrounding the GSMNP were too narrow and unsafe for most serious or recreational bike riding. They expressed some interest in riding completed sections of the parkway, but only when traffic was extremely light. Most roads in the vicinity of the parkway are frequently much too busy to be used safely.

The cyclists were unable to estimate the potential bicycle usage of the parkway section, either on the proposed automotive roadway or on some widened or additional path area. Bicycle use and

popularity has grown substantially in the past 5–10 years, but great concern was expressed again regarding the safety of the narrow existing and proposed roads. Based on the current design of Section 8B, the Foothills Parkway would be a two-lane parkway with one lane in each direction. The lane width is 3.1 m (10 ft) with no paved shoulder. Some of the access roads have a lane width of 2.7 m (8.8 ft). There was general agreement from those attending the meeting that bicycle usage for Section B would be very light if designed and constructed as currently envisioned.

Based on analysis of the Foothills Parkway Section 8B design plan and a comparison of that design with both the bikeway design criteria specified in the CDOT Highway Design Manual and comments solicited from members of several biking organizations in the Knoxville area, it has been concluded that the future bicycle use of this section of the Parkway would be very low and that any traffic flow impact associated with bicycle use on Section 8B would be negligible.

4.7.3.8 Summary

The Foothills Parkway is envisioned as a scenic, low-speed touring road and an integral part of the GSMNP, although it would not lie within the park boundary. Section 8B of the parkway would connect Cosby and Pittman Center. The analysis presented here indicates that traffic operation along this segment would be at LOS C and would accommodate future traffic adequately.

TDOT plans to widen the existing U.S. 321 near Cosby and Gatlinburg to four lanes. This would alleviate traffic congestion on U.S. 321 in the future. The four-lane segments of U.S. 321 would operate at LOS B in 2006. However, one segment of U.S. 321 from SR 416 to the convergence of U.S. 321 and SR 32 in Cosby would still be a two-lane highway. This two-lane segment of U.S. 321 would operate at LOS E in 2006 without the construction of Section 8B.

Construction of Sections 8B and 8C would alleviate some traffic on U.S. 321 from Cosby to Gatlinburg. The four-lane segments of U.S. 321 would still operate at LOS B in 2006. However, the two-lane segment of U.S. 321 would operate at LOS D in 2006.

Completion and opening of Section 8B prior to the completion of Section 8C would have a minor traffic impact on surrounding roadways between Cosby and Pittman Center. Traffic on SR 416 would increase by 85% compared with the no-build alternative if the Foothills Parkway interchange were connected to SR 416 in Pittman Center. The LOS would be C as compared to B under the no-build alternative in 2006. Otherwise, the two-lane segment of U.S. 321 would operate at LOS E during weekend peak periods if the Foothills Parkway interchange were connected to U.S. 321 near Pittman Center.

Traffic conditions for all alternatives and options in 2026 would be similar to those in 2006, except that traffic volumes would be somewhat higher and LOS along some roadway sections would degrade by one LOS category. All roadway sections would still operate at acceptable levels of service during the weekday peak periods, but the section of U.S. 321 between SR 416 and the convergence of U.S. 321 and SR 32 would operate at an unacceptable LOS (E) during weekend peak periods. This is true for the no-build scenario as well.

Almost all intersections within the Section 8B area would be constructed with Section 8B or would be included in currently planned highway improvement programs. These intersections would be designed and constructed properly so that all intersections would operate at an acceptable level of service in the future.

In general, completion of Section 8B would not have a significant traffic impact on surrounding roadways between Cosby and Pittman Center. Based on preliminary analysis, there would be no significant construction-related traffic due to the construction of Section 8B. Furthermore, there is no cumulative traffic effect if all Foothills Parkway segments are built and open to traffic in the future.

4.7.4 Future Noise Projections

4.7.4.1 Applied Methodology

ORNL projected future noise levels for 41 representative sites in the Section 8B study area for the A.M. and P.M. peak hours during weekdays and weekends for 2006 and 2026 for all construction alternatives and options. These noise level projections were calculated using the simple version of the FHWA Highway Traffic Noise Prediction Model. This procedure can be applied either by performing noise level calculations manually or by using FHWA's computerized version. The computerized version was used in this analysis; thus, it was only necessary to input the appropriate data into the model to generate scenario results. However, a description of the FHWA noise level prediction methodology is provided to help the reader understand the factors that affect predicted noise levels and to describe some of the assumptions made in the estimation process.

The FHWA model predicts traffic noise equivalency level (L_{eq}) using a series of calculations regarding the characteristics of the noise source and its spatial relationship to the receptor. The model considers the vehicle types and typical speeds of the vehicles that will be operating on the roadway, the roadway geometry, the terrain surface type between the source and the receptor, the presence of shielding between the source and receptor, and the uphill grade that will have to be traversed by vehicles. The following equation represents a simplified version of the methodology. A detailed description can be found in FHWA 1978.

$$\begin{aligned} \text{Noise level} &= \text{Reference energy mean emission level} \\ &+ \text{Traffic volume adjustment} \\ &+ \text{Distance adjustment} \\ &+ \text{Finite roadway adjustment} \\ &+ \text{Shielding adjustment} \end{aligned}$$

This methodology assumes that all traffic noise from passenger vehicles is caused by the friction between tires and the roadway. Therefore, the sound source is modeled at an elevation of 0 m (0 ft) (i.e., ground level). For heavy trucks, noise is generated from tire-roadway friction, engine noise, and exhaust. Engine noise and exhaust are modeled several feet above ground level. However, this model assumes no heavy trucks will be operating on the roadway (this is explained later). The receptor is assumed to be an average-sized human standing at the specified location; thus, the receptor is modeled at 1.5 m (5 ft).

As indicated by the equation, the first step in the analysis is to determine the reference energy mean emission level. The reference energy mean emission level is the typical level of sound energy emitted from a given vehicle type (i.e., passenger car, medium truck, heavy truck) traveling over a flat, straight roadway surface at a given speed as measured at a receptor site that is 15 m (49.2 ft) away. For this analysis, it was assumed that all traffic on Section 8B would travel at 48 kph (30 mph); all traffic on U.S. and State highways would travel at 80 kph (50 mph); and all traffic on local streets would travel at 40 kph (25 mph).

Once the reference energy mean emission level is determined, this estimate is adjusted based on the predicted amount of traffic that will travel over the roadway during a given time period. ORNL has predicted traffic volumes for several peak periods in the years 2006 and 2026. These projections were used to adjust the reference energy mean emission level by the number of vehicles of each type that would be traveling along the roadways near each receptor site. It was assumed that all vehicles on the Foothills Parkway would be passenger vehicles. For other vehicle routes, vehicle turning movement percentages and their associated vehicle type counts were used to determine vehicle type percentages. The percentage of heavy trucks was determined to be negligible; thus, the percentages of medium trucks resulting from these counts are listed below:

- U.S. 321 from Foothills Parkway Section 8A to SR 32 (9%)
- U.S. 321 from SR 32 to SR 416 (7%)
- U.S. 321 from SR 416 toward Gatlinburg (5%)
- SR 416 from U.S. 321 toward Sevierville (7%)

All other vehicles are assumed to be passenger vehicles.

As previously mentioned, the reference energy mean emission levels assume that the receptor is 15 m (49.2 ft) from the source. However, since most receptors will be closer to or farther away from the source, it is necessary to adjust the noise level by considering the actual distance between each receptor and the noise source(s). Therefore, the noise level is again adjusted upward for receptors that are closer to the source and adjusted downward for those further away. The amount of adjustment is calculated using a standard formula for the attenuation of noise over doubled distance. This attenuation is typically modeled as a drop of 3 dBA per doubling of distance for cases where a hard (mostly reflective) surface lies between the source and receptor, and is modeled as a drop of 4.5 dBA per doubling of distance when a soft (absorptive) surface exists. Other adjustments were made for small hills, berms, or other terrain features that may block the line of sight from the receptor to the roadway. Distances between the source and receptor were measured on-site using tape measures or range-finding devices where applicable. In other instances, distances were determined from maps or aerial photographs.

Possibly the most complex part of the analysis is determining the finite roadway adjustment factor. All calculations up to this point of the procedure assume that the roadway stretches out infinitely in both directions in a straight line. However, this is often not the case. This factor allows the analyst to correct for the potential impacts of roadway geometry on the sound level. For example, a house that is located in a sharp bend in a road may be closer to a larger portion of the roadway than if the roadway were straight. Conversely, a house located on the outer side of the bend may have more of the roadway farther away. In such instances, it is necessary to divide the roadway into separate sections, estimate the noise level for each section, and combine these estimates into a

single noise level (remember that noise levels are not additive). By doing so, the roadway is analyzed in finite rather than infinite sections. The calculations for these finite sections are relatively complicated; thus, the original source material should be consulted for a more mathematically oriented explanation of the procedure. Also, it should be noted that this calculation is not always necessary. Aerial photographs and maps were used to determine roadway geometry and other factors that would warrant sectioning the roadway for analysis purposes.

The final noise level adjustment accounts for any objects located between the source and receptor that would absorb sound or reflect it away from the receptor, such as noise barriers, trees, buildings, or other natural or man-made structures. This adjustment is based on FHWA guidelines and the judgement of the analyst, who considers several factors such as the size and position of the barrier as well as the reflective or absorptive nature of the barrier. For example, a row of houses between the roadway and the receptor might require a -3 dBA adjustment, in the judgement of the analyst, while 30.5 m (100 ft) of mature forest between the roadway and the receptor might require a -5 dBA adjustment. Aerial photographs and notes taken during data collection were used to determine the presence, position, and size of barriers such as buildings and vegetation.

Sections 4.7.4.2 and 4.7.4.4 discuss the results of the traffic noise analysis. Actual noise level projections for all alternatives and options and comparisons with the no-action alternative are presented in Tables L1–L11 of Appendix L. Site locations are presented in Figs. 86–90.

4.7.4.2 Traffic Noise

Construct Sections 8B and 8C with no interchanges. The opening of Sections 8B and 8C would divert tourist-related traffic from U.S. 321 to the Foothills Parkway. The Foothills Parkway traffic would be light and most of the U.S. 321 traffic would stay on U.S. 321. Similar to the no-build alternative, most sites would experience little traffic noise impact and would experience noise levels within the FHWA standard for residential areas. In 2006, the highest L_{eq} noise level at 34 sites would be below 50 dBA; no sites would experience levels between 50–60 dBA; and 5 sites would experience levels between 60–67 dBA. In 2026, the highest L_{eq} noise level at 34 sites would be below 50 dBA, and 5 sites would experience levels between 60–67 dBA. Noise levels at two sites (sites 6 and 19) would exceed standards by 2006. The addition of Section 8B would slightly decrease the traffic volume along U.S. 321, thereby decreasing the projected noise levels for sites 6 and 19 on U.S. 321 (Figs. 87 and 89).

Sites 16, 17, 18, 25, 26, 27, and 40 would experience perceptible increases in traffic noise, as much as 12 dBA during some peak periods, compared with the no-build alternative. The sometimes significant increases in traffic noise levels at these sites would be due to the low existing traffic noise levels. The projected noise levels for these sites are still low, ranging from 30 to 42 dBA. It should be noted that the existing noise levels measured at these sites are higher than the projected traffic noise levels. This suggests that ambient noise other than traffic noise dominates the noise level at these sites.

Foothills Parkway interchange at SR 416 with north ramp or south ramp. Under these build options, some of the traffic on Sections 8B and 8C would use SR 416. Such Foothills Parkway-related traffic on SR 416 would be very light. Therefore, the noise impact would be similar to that

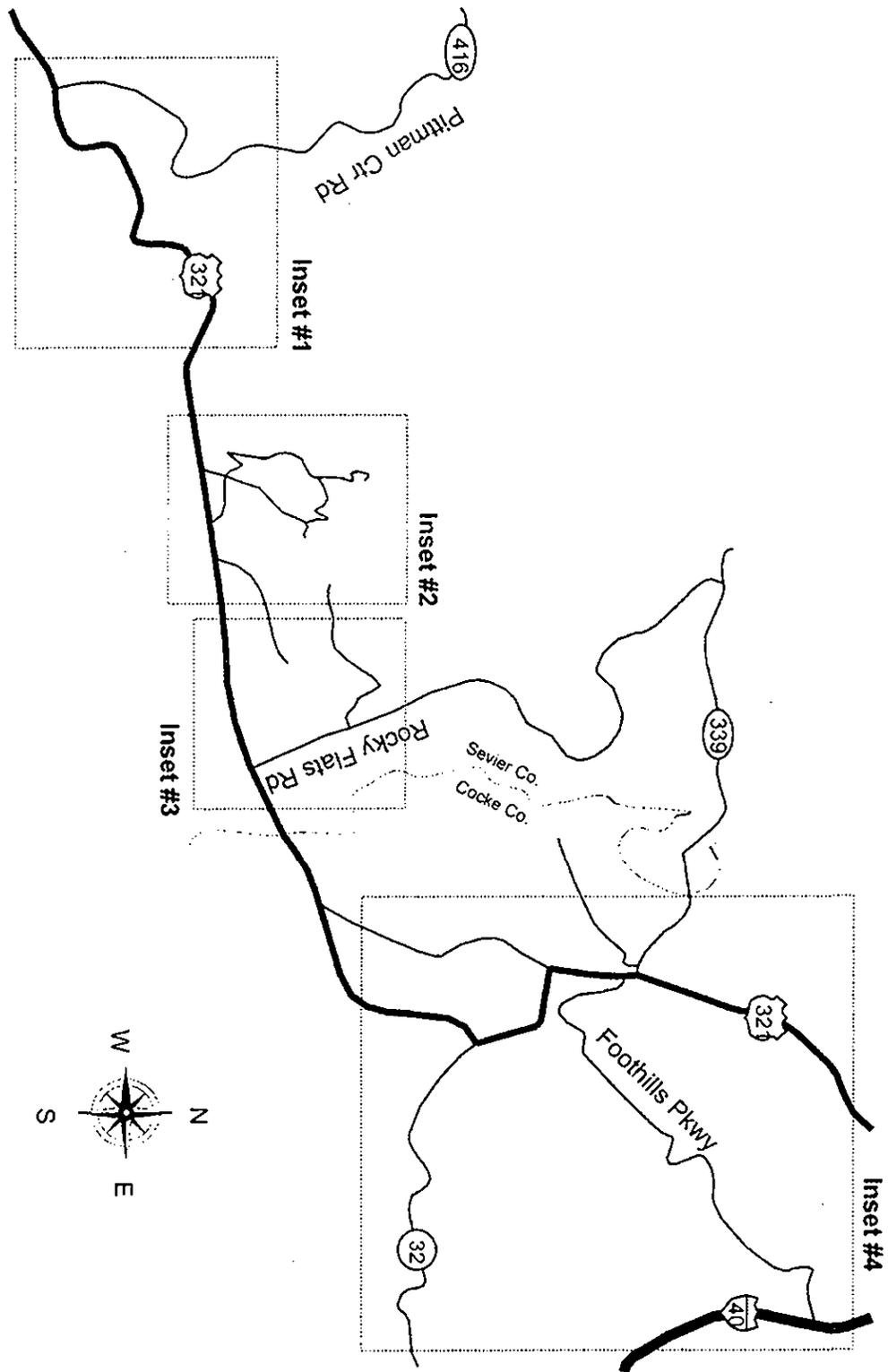


Fig. 86. Area map for ambient noise level measurement sites.

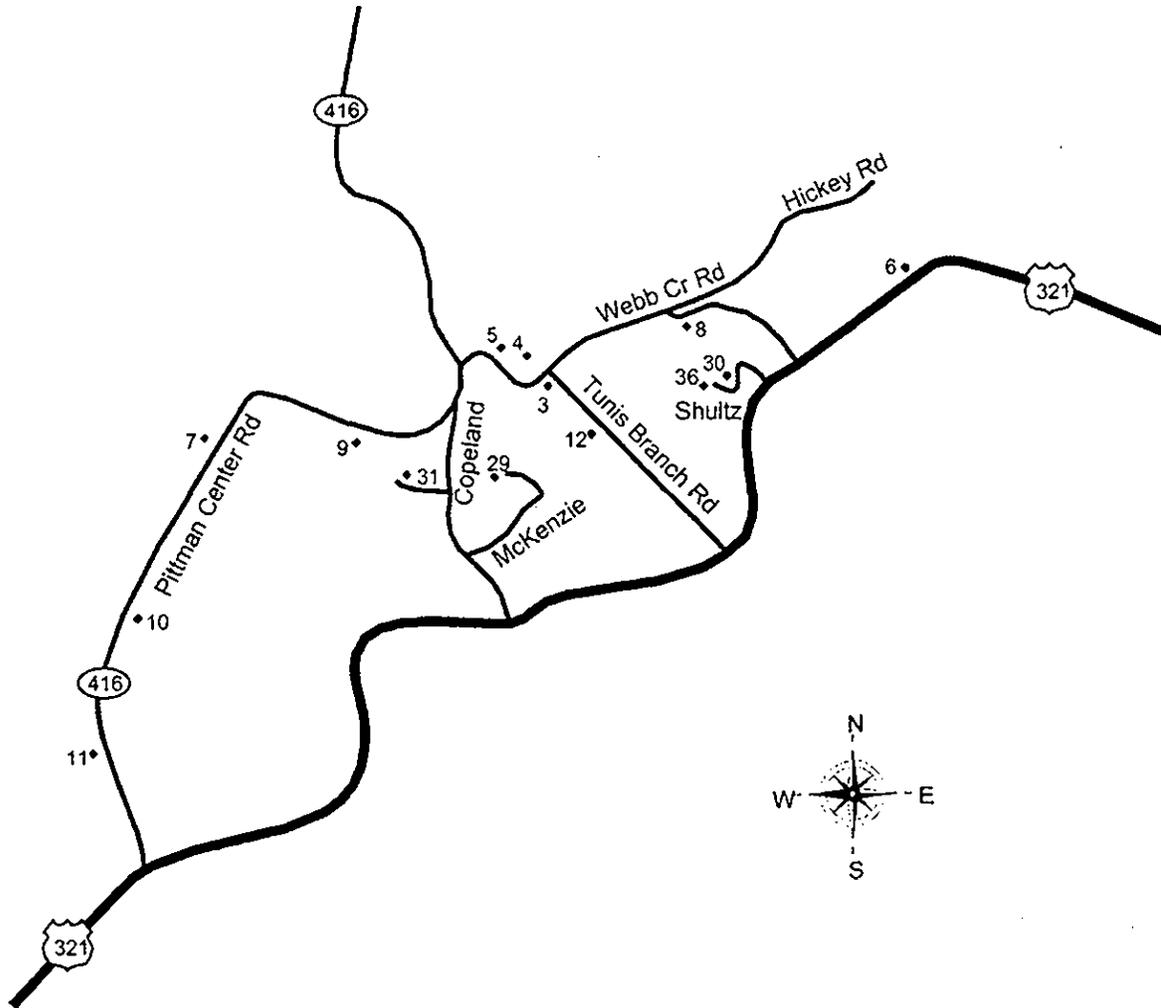


Fig. 87. Area map for ambient noise level measurement sites, Pittman Center area.

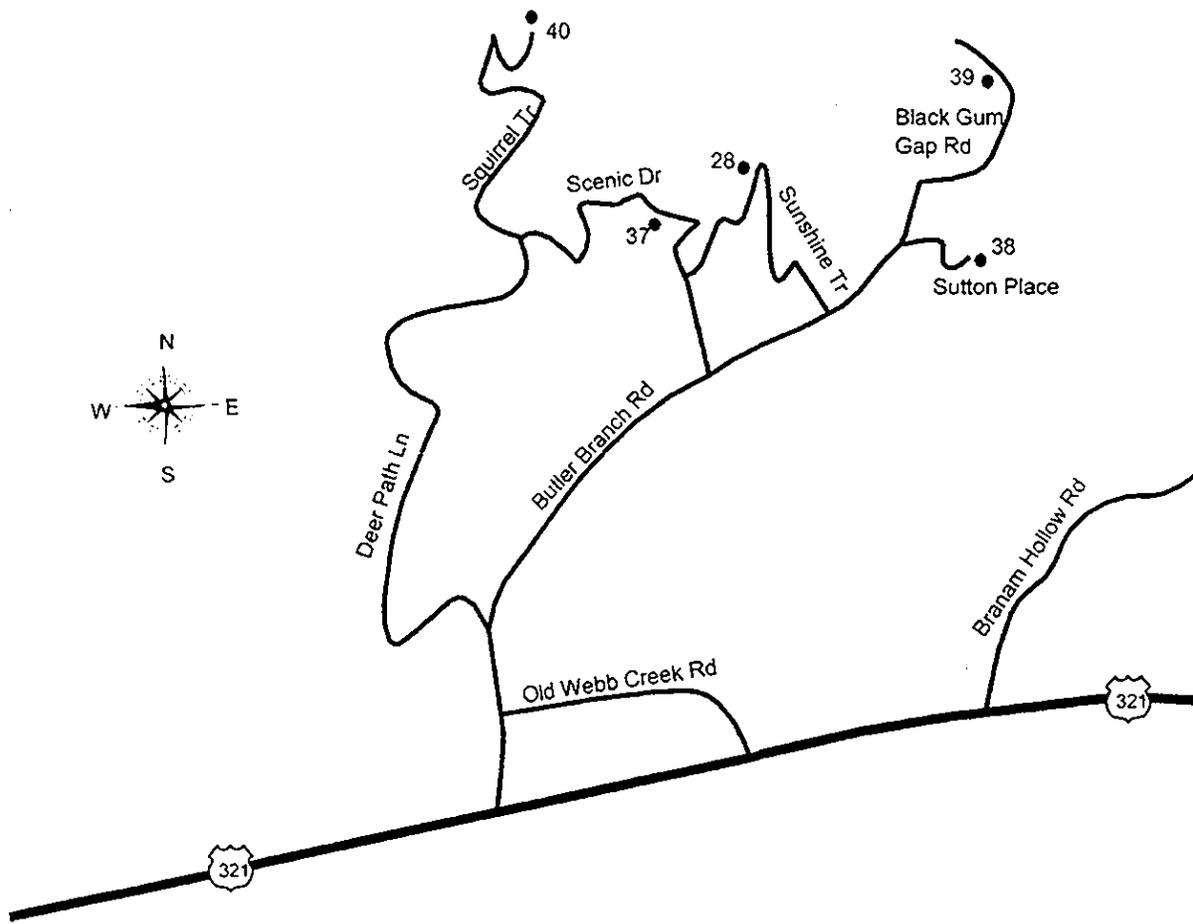


Fig. 88. Area map for ambient noise level measurement sites, Cobbly Nob area.

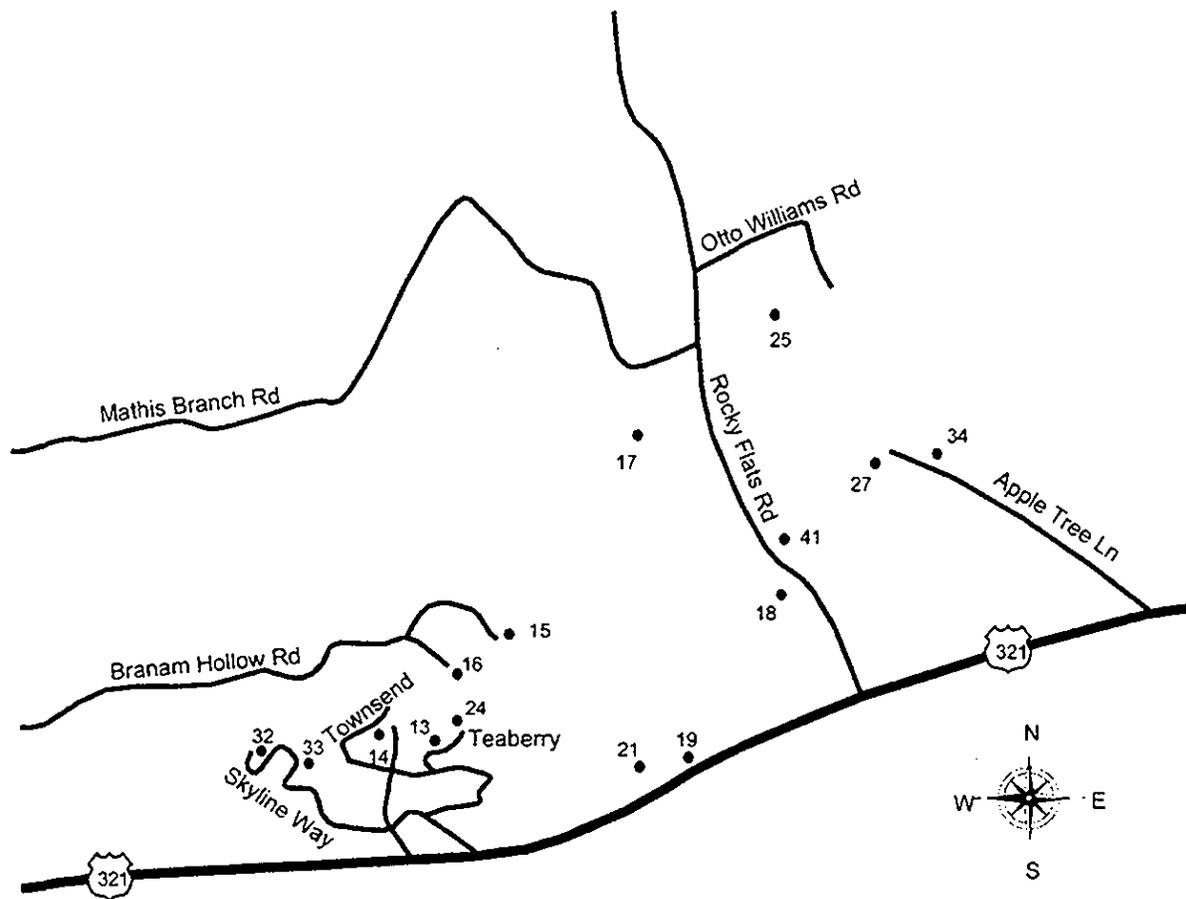


Fig. 89. Area map for ambient noise level measurement sites, Rocky Grove area.

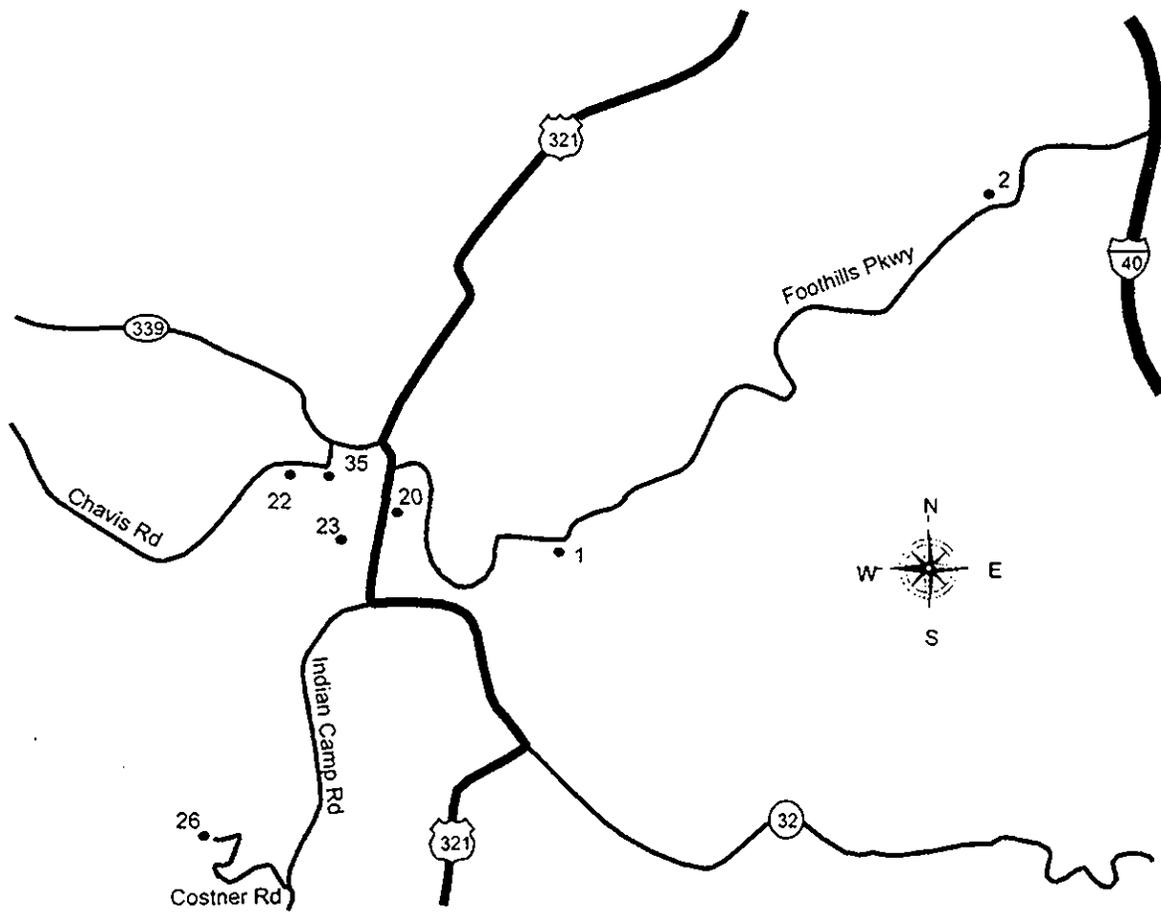


Fig. 90. Area map for ambient noise level measurement sites, Cocke County area.

of the "no interchange" option (i.e., most sites would experience little traffic noise impact and would experience noise levels within the standard for residential areas). By 2026, the highest L_{eq} noise level at 34 sites would be below 50 dBA, and 5 sites would experience levels between 60–67 dBA. However, all sites along SR 416 would experience noise levels below the FHWA-established standard of $L_{eq} = 67$ dBA. Noise levels at sites 6 and 19 along U.S. 321 (Figs. 87 and 89) would exceed standards by 2006.

Sites 16, 17, 18, 25, 26, 27, and 40 would experience perceptible increases in traffic noise, as much as 12 dBA during some peak periods, compared with the no-build alternative. These increases would be identical to those under the "no interchange" option. The significant increases in traffic noise levels at these sites would be due to the low existing traffic noise levels. The projected noise levels for these sites are still low, ranging from 30 to 42 dBA, and fall well below the FHWA-established standard for residential areas. The existing noise levels measured at these sites are higher than the projected traffic noise level. This indicates that ambient noise rather than traffic dominates the noise level at these sites.

Foothills Parkway Interchange at U.S. 321 with two different ramp connection configuration options. These build options are very similar to those discussed for the SR 416 ramp options, except that the Foothills Parkway Pittman Center interchange would be at U.S. 321 instead of at SR 416. Some of the Section 8B and 8C traffic would use U.S. 321 directly. Such traffic would be very light. Most sites would experience little traffic noise impact and would experience noise levels within the standard for residential areas. By 2026, the highest L_{eq} noise level at 34 sites would be below 50 dBA, and 5 sites would experience levels between 60–67 dBA. Noise levels at sites 6 and 19 along U.S. 321 would exceed standards by 2006.

Sites 16, 17, 18, 25, 26, 27, and 40 would experience perceptible increases in traffic noise compared with the no-build alternative, as much as 12 dBA during some peak periods. The sometimes significant increases in traffic noise levels at these sites would be due to the low existing traffic noise levels. The projected noise levels for these sites are low, ranging from 30 to 42 dBA, and fall well below the FHWA-established standard for residential areas. As indicated, the existing noise level measured at these sites is higher than the projected traffic noise. This indicates that ambient noise other than traffic dominates the noise level at these sites.

Section 8B begins operation before completion of Section 8C with interchange at SR 416. Under this alternative, all traffic on Section 8B must use SR 416 to enter and exit the Foothills Parkway and continue trips on U.S. 321. Consequently, the noise levels at site 10, in addition to those at sites 6 and 19, near SR 416 would exceed FHWA residential noise standards by 2006. Most other sites would experience little traffic noise impact and would experience noise levels within the standard for residential areas. By 2026, the highest L_{eq} noise level at 34 sites would be below 50 dBA, and 4 sites would experience levels between 60–67 dBA. Noise levels at sites 6 and 19 along U.S. 321 (Figs. 87 and 89) would exceed standards by 2006.

Sites 10, 11, 16, 17, 18, 25, 26, 27, and 40 would experience perceptible increases in traffic noise, as much as 12 dBA during some peak periods, compared with the no-build alternative. The increase in traffic noise levels at sites 10 and 11 would be due to added Section 8B traffic on SR 416. Traffic noise level increases at the other sites would be identical to those under the "no-build" option. The increases in noise levels at these sites would be due to the low existing noise

levels. Still, the projected noise levels for these sites are low, ranging from 30 to 42 dBA, and fall well below the FHWA-established standard for residential areas. As indicated, the existing noise levels measured at these sites are higher than the projected traffic noises. This indicates that ambient noise rather than traffic dominates the noise level at these sites.

Section 8B begins operation before completion of Section 8C with interchange at U.S. 321. Under this build option, all traffic on Section 8B could use U.S. 321 directly to enter and exit Foothills Parkway. No Foothills Parkway-related traffic would use SR 416. Thus, most sites would experience little traffic noise impact and would experience noise levels within the standard for residential areas. By 2026 the highest L_{eq} noise level at 34 sites would be below 50 dBA, and 5 sites would experience levels between 60–67 dBA. Noise levels at sites 6 and 19 along U.S. 321 (Figs. 87 and 89) would exceed standards by 2006.

Sites 16, 17, 18, 25, 26, 27, and 40 would experience significant increases in traffic noise, as much as 12 dBA during some peak periods, compared with the no-build alternative. The significant increases in traffic noise levels at these sites would be due to the low levels of existing traffic noise. Still, the projected noise levels for these sites are low, ranging from 30 to 42 dBA, and fall well below the FHWA-established standard for residential areas. As indicated, the existing noise levels measured at these sites are higher than the projected traffic noise levels. This indicates that ambient noise rather than traffic dominates the noise level at these sites.

No-action alternative (no-build). Noise projections for the study area indicate that, for the no-build alternative, most sites would experience little traffic noise impact and would experience traffic noise levels below the FHWA-established standard for residential areas through the year 2026. Most sites (34 sites) have a projected noise level of less than 50 dBA during the noisiest peak period in both 2006 and 2026; two sites have levels 50–60; and only three sites have levels between 60 and 67 dBA.

Two sites along U.S. 321 would experience noise levels that exceed this standard by the year 2006 because of their close proximity to the highway and the large volume of traffic expected to travel along it. The projected L_{eq} noise levels at these sites (i.e., sites 6 and 19) would range from 70 to 73 dBA by 2006 and from 70 to 75 dBA by 2026. Both sites are located very close to U.S. 321 (Figs. 87 and 89). Thus, it should be noted that the noise from U.S. 321 would dominate the overall noise levels at these sites, making the impact of parkway noise negligible.

4.7.4.3 Construction Noise

Calculation of construction noise levels is usually not necessary for traffic noise analyses. Such analyses are data intensive and are usually reserved for complex or controversial major urban projects. FHWA guidelines suggest that, in cases where a noise analysis is not warranted, a common-sense approach to noise management and abatement be used (FHWA 1984). Standard noise mitigation methods suggested by the FHWA are presented in Sect. 5.7.3.

ORNL does not expect any serious noise impacts from the Section 8B construction process. The nearest sensitive receptors are over 91 m (300 ft) from the proposed centerline of the parkway and should be approximately 76 m (250 ft) from any related construction activity, such as clearing, cutting, or filling. Furthermore, construction activity would be temporary and would most likely be

conducted during regular working hours. Still, noise from construction equipment is harsh and annoying, and the relative serenity of the surrounding area is likely to make these noises more noticeable. Rental properties that depend upon the serenity of the area might also be temporarily affected by construction noise. Thus, the NPS may want to consider conducting a formal noise study if it feels the topic of construction noise is controversial or highly sensitive to area residents. A noise study might also be warranted if the proposed location of the parkway is changed in the future so that it lies closer to existing residences.

It should be noted that, at this time, a formal, accurate, quantitative analysis of noise impacts cannot be performed. Detailed engineering and construction plans for Section 8B are not yet developed, and the contract for construction has yet to be prepared. Thus, detailed information on the number of the various pieces of equipment that would be used, their specifications, the locations at which they would be used, and their operation schedules are not yet available.

In projecting the air quality impacts of the construction process, ORNL has made some assumptions regarding the number of pieces and types of equipment that would be used in constructing Section 8B, along with the amount of time this equipment would be in operation. However, while these assumptions are adequate for estimating air pollution, they are less useful for estimating the resulting sound levels that would be experienced by sensitive receptors in the area. Emission of airborne pollutants depends primarily on the types of equipment used and the amount of time each is in operation. For adequate noise level analysis, however, the number of pieces of each type of equipment that would be working simultaneously at each site must be determined. Furthermore, the position of the sound source(s) relative to sensitive receptors must be determined so that the effects of topology, terrain, and other noise-attenuating factors can be considered as well. Thus, the NPS, the FHWA, or the contractor would have to provide a construction schedule and haul road routes if an accurate noise analysis were to be performed.

Table 63 has been provided to describe the noise levels that are typically emitted by various types of equipment used in highway construction, as well as some generalized estimates of the amount of attenuation that can be expected at various distances from the construction area. A number of assumptions have been made regarding terrain, the presence of natural noise barriers (e.g., trees), and other factors that affect noise attenuation. It should be understood that these noise levels are rough estimates for single pieces of equipment only (except in the cases of scrapers and dump trucks) and do not represent an actual analysis.

4.7.4.4 Traffic Noise Summary

The noise analysis indicates that, for each of the build options, noise impacts would be quite similar, and none of the construction options should increase noise levels above FHWA standards for residential areas by 2026. The traffic noise levels would increase significantly at some receptor sites, but would still remain lower than the ambient noise levels currently existing. Therefore, existing noise levels would dominate, and traffic noise impacts would be negligible at most sites.

The analysis does, however, indicate that noise levels at two sites along U.S. 321 will likely exceed FHWA standards by the year 2006 under almost all alternatives and options, including the no-build alternative. It is likely, however, that traffic unrelated to the Parkway will be primarily

Table 63. Construction noise levels for typical equipment types at various distances

Equipment type	Generalized noise level L_{eq} (dBA) at distance from source								Noise source type
	50 feet	100 feet	200 feet	300 feet	400 feet	500 feet	750 feet	1,000 feet	
Backhoe	82.6	73.1	63.5	57.1	52.0	47.6	43.2	40.1	Point
Loader	83.1	73.6	64.0	57.6	52.5	48.1	43.7	40.6	Point
Compressor	88.4	78.9	69.3	62.9	57.8	53.4	49.0	45.9	Point
Pile driver	90.4	80.9	71.3	64.9	59.8	55.4	51.0	47.9	Point
Pump	70.1	60.6	51.0	44.6	39.5	35.1	30.7	27.6	Point
Crane	80.6	71.1	61.5	55.1	50.0	45.6	41.2	38.1	Point
Rock drill	88.1	78.6	69.0	62.6	57.5	53.1	48.7	45.6	Point
Std. jackhammer	79.1	69.6	60.0	53.6	48.5	44.1	39.7	36.6	Point
Concrete pour	72.1	62.6	53.0	46.6	41.5	37.1	32.7	29.6	Point
Batch plant	89.1	79.6	70.0	63.6	58.5	54.1	49.7	46.6	Point
Pump (concrete)	84.1	74.6	65.0	58.6	53.5	49.1	44.7	41.6	Point
Concrete mixer	81.9	72.4	62.8	56.4	51.3	46.9	42.5	39.4	Point
Generator	80.1	70.6	61.0	54.6	49.5	45.1	40.7	37.6	Point
Grinder	69.1	59.6	50.0	43.6	38.5	34.1	29.7	26.6	Point
Concrete saw	87.1	77.6	68.0	61.6	56.5	52.1	47.7	44.6	Point
Fan	82.1	72.6	63.0	56.6	51.5	47.1	42.7	39.6	Point
Welder	70.1	60.6	51.0	44.6	39.5	35.1	30.7	27.6	Point
Bulldozer	93.1	86.6	80.1	75.5	71.6	68.1	65.5	63.6	Area
Grader	65.3	58.8	52.3	47.7	43.8	40.3	37.7	35.8	Area
Compactor	91.0	84.5	78.0	73.4	69.5	66.0	63.4	61.5	Area
Paving equipment	60.9	54.4	47.9	43.2	39.4	35.9	33.3	31.4	Area
Dump truck (quiet)	52.2	45.7	39.2	34.5	30.6	27.2	24.6	22.7	Line
Dump truck (noisy)	57.2	50.7	44.2	39.5	35.6	32.2	29.6	27.7	Line
Scraper (muffled)	60.9	54.3	47.8	43.2	39.3	35.9	33.2	31.3	Line
Scraper (nonmuffled)	71.9	65.3	58.8	54.2	50.3	46.9	44.2	42.3	Line

Source: Estimates in this table were based primarily on data and methods in Vanderbilt 1982, Bowby and Cohn 1983.

Note: A wide variation of noise level in equipment is not uncommon. It was found that, in the field, nominally identical pieces of equipment could produce noise levels that differ from 10 dB or more. Usually, a relatively few pieces of heavy equipment are used at the same time at a construction site. Caution must be exercised in any use of average noise levels for a specific case.

Assumptions:

- (a) Terrain was assumed to be soft, non-reflective.
- (b) Trucks and scrapers were assumed to travel by every 6 min while in operation. Trucks were assumed to travel at 56 kph (35 mph); scrapers were assumed to travel at 48 kph (30 mph).
- (c) Equipment is assumed to operate for 6.5 hours per 8-hour workday.
- (d) A small amount of attenuation was assumed that would be due to natural vegetation barriers (such as trees) between the source and receptors. This attenuation was increased from 0 dBA at 15 m (50 ft) to 10 dBA at 1524 m (500 ft), approximately 2 dBA per 30.5 m (100 ft) up to a maximum of 10 dBA.

responsible for these exceedances. Therefore, it is believed that traffic flows resulting from the construction of Section 8B would have little effect on the noise levels prevalent in the surrounding areas.

Parkway construction would likely cause an elevation in noise levels at some sites. These increases would be temporary in nature, would take place during normal working hours, and should pose no threat to the personal health of persons at the studied sites. The nearest sensitive receptors should be located more than 91 m (300 ft) from the Parkway centerline and would likely be at least 76 m (250 ft) from any construction activity. This distance between the source and receptor, along with the presence of trees and other sound barriers, should provide for adequate attenuation of noise during construction. However, the NPS should consider measures to reduce construction noise where possible and monetarily feasible.

4.8 AESTHETIC RESOURCES

4.8.1 Introduction

This section deals with the environmental (aesthetic) consequences of potential actions in parkway development. There are both positive and negative considerations. These include clearing of forest, improved visual access to the GSMNP, interpretative resource improvement, and the effect of the parkway itself being seen from many different vantage points or by people with different interests and values. Safety around developed viewing or interpretative areas also weighs heavy in some areas close to public roads.

4.8.2 Views From the Parkway

Effects from development of aesthetic resources will be reviewed for the parkway section as a whole and for specific sites listed in Table 64.

To develop major aesthetic resources listed in Table 64 would involve clearing and maintaining approximately 10.75 ha (25.34 acres) of land in low vegetation on road fills and existing native forest adjacent to the proposed parkway. About 60 percent of the clearing would be at the highest elevations with 4 ha (10 acres) being maintained on the top of Webb Mountain alone.

To develop major aesthetic resources listed in Table 64 of Section 8B would involve maintaining low vegetation on approximately 10.75 ha (25.34 acres). Low vegetation includes grasses, shrubs, and trees that are periodically trimmed back to about two feet in height and permitted to regrow until it interferes with viewing scenery. The frequency of trimming would range from more than once a year to once every several years. About 60 percent of the maintained vegetation would be at the highest elevations with a good portion of this [4 ha (10 acres)] being maintained on top of Webb Mountain. Eight of the eleven sites involve maintaining less than 1 ha (<2.54 acres).

There are some negative ramifications as a result of this vegetation maintenance. From an aesthetic perspective, the maintained vegetation will appear rough with briars, stumps, and thick growth of short vegetation. Unusual plants and selected wildlife may occupy these areas and provide some interesting experiences. At the same time, exotic pest plants may become established. Also, the

Table 64. Sites identified for scenic, aesthetic, and interpretative development along 23.8 kilometers of proposed parkway

Segment number	Roadway station	Rating and view identification	Forest cleared (ha)	Forest cleared (acres)	Description
1	1-400 to 1-680	1-2 1A	0.75	1.85	West terminus at Little Pigeon River
2	2-380 to 2-970	2 2A	0	0	Webb Creek valley view of water, farm land, and houses
2	4-580 to 4-700	3 2C	0.4	0.99	Good westerly view of GSMNP with tree clearing
3	6-500 to 7-200	3A1	0.25	0.62	Quiet stream walkway
3	8-700	2 3C1	0.3	0.74	Trail to scenic view south of GSMNP
3	8-120 to 9-170	1 3C	2.5	6.18	Composite views south from lower parking lot and parkway
3	Upper parking	1 3D	4.0	9.88	Upper Webb Mountain parking panorama
5	15-050 to 15-600	3 5A	0.25	0.62	Valley alternative for aesthetics, stream, and old stone walls
6	18-800	4 6C	0.5	1.24	View east spectacular of developed, but narrow view
7	21-200	3 7A	1.0	1.24	East-southeast view up GSMNP ridge w/pull-over at Camp Creek
7	23-800	3 7C	0.8	1.98	View of stream, Cosby Creek, and community
Total			10.75	25.34	

continued maintenance of the vegetation generates long term expenses. Such trimming of vegetation may also add negative contrast by widening the appearance of the corridor and creating vegetation cover that has a different color and texture to forests that appear in the background.

The views selected for development accomplish one or more of three things:

- Enhance special views of the GSMNP from desirable angles,
- Provide cultural or historic interpretation opportunities,
- Enable closer view of water and the natural environment

An evaluation according to these objectives showed:

- 6 sites provided excellent views of all aspects of the GSMNP
- 5 sites addressed cultural, environmental, or historical resources
- 4 of the 5 interpretive sites brought viewers close to water

These sites stretch the entire length of 8B with many concentrated near the top of Webb Mountain where views are most spectacular and at both ends of the ROW where water and cultural resources are present. The effect to the view is to offer the themes of culture, environment, wilderness, and panoramas where passive or active participation can be involved at each location.

The views of the eastern half of GSMNP from 8B offer, for the public, the opportunity for exceptional scenic viewing that would otherwise not be available. U.S. 321, the most likely alternative, is positioned at a low elevation and is bordered most of its length by trees, commercial development, or homes. Some commercial developments offer nice views of the park but only to the paying public. It is also likely that incremental development and the accompanied fragmentation and/or removal of resources would make it increasingly difficult in the future to capture the aesthetic resources the parkway would offer the public.

4.8.2.1 Safety

The development of parking lots and trails near existing roads is an enticement for various problems. These include waste dumping, vandalism, and personal safety, especially at night. This is of special concern at both ends of 8B and include sites 1A, 2A, 5A, and 7C.

The opportunity for excess waste dumping, problems in not collecting wastes on time, and users dropping trash and garbage on trails and in streams could contribute to the pollution of relatively clean streams. Pest animals (e.g., skunks, opossums, bears, raccoons, rats, and feral cats and dogs) could also be attracted and create problems in these developed areas, especially where they are close to other developments.

Flooding can happen very quickly in and around the GSMNP. Development of interpretive facilities in floodplains (sites 1A, 2A, 5A, and 7C) could create a dangerous situation in time of flash floods.

General safety at overlooks and interpretative sites is always a concern. For example the parking lot atop Webb Mountain, as planned, would include high retaining walls. These may be up to 28 ft (8.5 m) high which could pose safety problems. Another example is one where people lose their way from trails and get lost.

4.8.2.2 Cuts and Fills

Views of parkway cuts and fills from the parkway would be unsightly at first and only gradually improve to a more natural state. The additional clearing and maintenance of vegetation at developed viewing sites, in one or two cases, would increase the visibility of cuts and fills nearby. These would be most pronounced at the steepest areas, mainly the lower parking lot on Webb Mountain.

4.8.3 Aesthetic Quality

Two major points are exhibited by Table 65. First, the aesthetic quality of view sites does not exhibit a normal distribution. The overall experience, although seemingly dominated by larger numbers of lower-rated views, would be remembered based on the very best views.

Table 65. Aesthetic quality rating summation

Aesthetic experience	Number of sites
1 (very best)	3 (all in segments 3 and 4)
2 (best)	6 (none in segments 5, 6, and 7)
3 (better)	9 (fairly evenly spread)
4 (good)	11 (none in segment 3, most in 4, 5, and 6)
5 (fair)	3 (more exist but tended to be disregarded as views)

The second conclusion from the table is that the viewing experience from the eastern portion of the proposed Section 8B parkway is considerably less exciting than that from the center and western portions. The average viewing quality ratings by segment reveal this more clearly. Starting with segment 1 and progressing to 7, the average ratings are 3, 3.5, 1.8, 3.2, 4, 3.8, and 3.3, respectively. Segment 3 is the closest to the peak of Webb Mountain and presents the most panoramic views. Segments 5, 6, and 7 have no views that are rated 1 or 2. It would be necessary in these segments to provide pull-out improvements to views rated as 3. This draws attention to View 7A (see Sect. 3.8) where a pull-over may be possible.

4.8.4 General Analysis for Views of Section 8B

The potential impacts of viewing the proposed parkway (from other than the parkway itself) have been summarized in Table 66. The analysis for Table 66 involved assessing the degree of negative visual impact of the parkway. This was based on the contrast of the parkway features with surrounding conditions, the distance from which parkway features would be viewed, and the sensitivity as well as number of viewers. The most severe negative impacts are anticipated to be to landowners (residents) where the parkway would be in the foreground or midground of their view (their having assumed the view would always be forested). Most of this is located along the east side of Cobbly Nob, segment 4, and along segment 6.

The visual and aesthetic effect of the parkway on viewers traveling U.S. 321 and stopping at commercial developments along this route are minor. These effects are mainly concentrated in areas where the parkway comes close to U.S. 321. This would be near Webb Creek Road; near site 2C at Timothy Creek and on U.S. 321; just west of Rocky Flats; and along a portion of segment 6 near view 6B.

The anticipated effect of the parkway to hikers in the GSMNP would depend on levels of haze in the air. At 5 to 8 kilometers (3 to 5 miles) distant, the parkway would be conspicuous only on clear days. Most views from near Mount LeConte, Charlies Bunyon, Mount Cammerer, and Mount

Table 66. General impacts from views of the proposed parkway

Distance of view	Source of viewing	Context of view	Noted contrasts	Negative severity rating ^a
Foreground	U.S. 321	With other roads and traffic	Slightly more cuts and fills with limited added contrasts in form, line, color, texture, etc.	2
Foreground	Landowners away from U.S. 321	Wooded with some houses	Major change in view and contrasts in form, line, color, texture, noise, etc.	4-5
Midground	U.S. 321	Combination of development and forest view; focus is toward GSMNP	Moderately added contrasts in line, color, and texture (not all variables)	3
Midground	Resort/landowners away from U.S. 321	Forests with some houses	Major changes in most variables and high sensitivity	4
Farground	Hikers in GSMNP	Nearly total forest and rolling mountains	Road inflicts significant texture and color contrasts; viewer sensitivity significant	3-4

^aA severity rating of 1 implies total acceptability and minimum contrast; a rating of 3 implies minimally acceptable conditions of visual impact (mitigation may help significantly); a rating of 5 implies heavy impact and slim opportunities through mitigation to make the visual experience acceptable.

Guyot would not reveal Webb Mountain but several overlooks do (see Fig. 72). Only the most astute hikers would notice the parkway's development.

The proposed parkway would impose cuts, fills, and a linear road surface into scenes that have some combination of natural forests and development. Forests have their own characteristic lines, colors, textures, and even forms (e.g., shapes of whole stands of one forest type) set into a geological landscape having its own combinations of forms (e.g., rounded mountains) and lines (e.g., horizons and ridgetops). Development has its forms, lines, and colors, too. Contrasts (in this case implying negative visual impact) arise when these background conditions are significantly changed by new development such as Section 8B.

Table 66 provides evaluations of groups of views. This was done to simplify the presentation of results. Several specific views are evaluated later in the text with slightly more explanation. The specific ratings still fall within those of the viewing groups in Table 66. The evaluations were analyzed in considerable detail, but worksheets were not developed.

The parkway would have cuts and fills that have their own rounded forms. These new forms would not match the forms of the mountains, the forests, and some components of development. If other roads and road cuts were present, the contrast would be diminished because the new road would fit in better with the other roads and the view would not be changed very much.

These cuts and fills are most pronounced when their color and texture exists nowhere else in the landscape and they are in stark difference to the surroundings. Fills of orange/red dirt or bright, freshly crushed rock contrast with forest greens and browns. Contrasts can be diminished by distance, reshaping cuts and fills to match the landscape, changing the color of cuts and fills to better match their surroundings, and modifying the texture to mimic forest canopies. Table 66 assesses these issues in very summary form.

The outcome of this assessment (see Table 66) suggests that the most significant visual impacts would occur with observations of the parkway from (1) foreground and midground views by local landowners and (2) foreground views by hikers in the GSMNP. The viewing of the parkway by traffic along U.S. 321 would be affected, but the severity of impacts would not be large.

For the GSMNP hikers, mitigation measures along segment 3 can probably lessen viewing impacts to a solid 3 rating, which would probably be minimally acceptable. Even by employing the most extreme mitigation measures to reduce the unsightliness of cuts and fills, local land owners may not be satisfied (Table 67).

Mitigation measures should be focused on the following issues.

- Reduction of contrasts of cuts and fills along segment 3 to GSMNP trail hikers.
- Minimizing the surface area of cuts and fills and reducing contrasts of these to background vegetation, especially along segments 3 and 4 where most landowners are affected.
- Reducing impacts of cuts and fills (i.e., high-contrast views) at the western terminus where local landowners, U.S. 321 traffic, and high-quality visual resources (water) are involved.

4.8.5 Aesthetic Impacts of No Action

The no-action alternative has some strong aesthetic benefits as well as costs. These are, for the present, in fairly close balance. Perhaps the main question is whether the benefits of the views created from the parkway would be significantly offset by the negative views of the parkway. The initial balance would be close because the effects of road construction, cuts, fills, and notches for pull-overs and ridgetop crossings would be most pronounced in their new state. If the aesthetic decision were based on this temporary condition, the analyses would favor no action. It would take time to reduce these initial negative impacts. Once accomplished, however, the analyses would favor action with significant qualifications about the cut and fill issues. Without the development of the parkway, the entire issue of mitigation is avoided. However, some of the best viewing of the GSMNP from the entire parkway (not just Section 8B) would not be realized.

Views of the GSMNP along U.S. 321 are the closest substitute if Section 8B is not constructed. U.S. 321 is relatively straight, allows higher speeds, and has places to pull-over on gravel shoulders for several views of the GSMNP. There are not as many viewing opportunities as from the proposed parkway, and the views are of substantially lower quality from U.S. 321 because of the limitation of views, speed of traffic, developed nature of most of the foreground, obstruction

Table 67. Specific views of Section 8B

View description	Rating
Near Timothy Creek along U.S. 321 toward parkway km 4.8 (foreground). Cuts and fills on wooded hillside behind roadside development	3
Along U.S. 321 near Darky Branch with a view of segment 3 (farground). Cuts and fills on wooded far mountain with development in foreground	3
To rear of Deer Ridge Mountain Resort houses (foreground and midground). Cuts and fills in total forest seen from private residence	4-5
Along U.S. 321 near Texas Creek of parkway km 12 to 13 (mostly foreground). Cuts highly visible on near slopes just behind development	3
Along U.S. 321 near Rocky Grove Church of parkway km 14-500 to 14-800 (mostly foreground. Development in foreground, moderate requirement to look up to see view	2
Along U.S. 321 west of Sevier/Cocke County line at parkway km 17-000 (midground). Considerable development and orchard near U.S. 321, scrubby forest, but some direct viewing of parkway on low midground-foreground ridge	2-3
From trails in the GSMNP (farground) mostly of segment 3. Other segments would blend closer with U.S. 321 developments. Cuts and fills against entirely wooded hillside and scene (U.S. 321 often hidden from view)	3-4

^aA severity rating of 1 implies total acceptability and minimum contrast; a rating of 3 implies minimally acceptable conditions of visual impact (mitigation may help significantly); a rating of 5 implies heavy impact and slim opportunities through mitigation to make the visual experience acceptable.

by foreground vegetation, and noises and smells when stopping. U.S. 321 cannot be considered an adequate proxy for Section 8B in viewing experience of the GSMNP. No view from U.S. 321 can be rated a 1 or perhaps even a 2. The views from U.S. 321 can be expected to decline with time as development becomes more prolific. Development of U.S. 321 in place of Section 8B would not provide a comparable aesthetic experience.

The negative visual effects of serious road cuts on the upper face of Webb Mountain facing the GSMNP would not take place with the no-action alternative. The face would appear completely forested and wild from U.S. 321, from other points on the parkway, and from trails in the GSMNP. This is the major aesthetic benefit of not constructing the parkway.

The construction of the proposed parkway would set in motion the long-term commitment of the region to higher quality public tourism and traffic control. Without parkway construction, the area would be at the mercy of individual development interests and, to a lesser extent, municipal

planning. A long-term outlook on aesthetics and tourism favors construction of the parkway. A near-term outlook is less clear but still favors the aesthetic advantages construction of the parkway would provide to tourists.

The no-action alternative allows the fewest people to capture existing benefits while not changing benefits to a greater number of people. Those who benefit tend to be local residents near U.S. 321 and hikers in the GSMNP. In comparison, the build options provide benefit to a greater number of individuals while reducing aesthetic benefits to these same few people (i.e., local residents).

4.8.6 Summary of Aesthetically Preferred Build Options

Western exit ramp across the Little Pigeon River: The north option is recommended. Both the north and south alternatives for this exit ramp would be within forest cover of the Little Pigeon River floodplain. The south option is longer, meaning more forest clearing. It would also be more easily seen upon descending into the floodplain coming from the east. Alignment of the north alternative with Webb Creek Road at its intersection with SR 416 is also more aesthetically desirable. Access to the parkway would be less confusing, seem more direct, and be well connected to the aesthetics of Webb Creek Road itself. This assumes most of the access would be related to U.S. 321 nearby.

The intersection in the north option would be in a more closed, wooded, mountainous, and streamside situation (e.g., confluence of Webb Creek and Little Pigeon River) than the south option. The south option places an intersection in a private residence front yard. This is not a desirable environment for a scenic parkway exit intersection.

Tunnel versus no tunnel options: The absence of a tunnel means steep road cuts would be highly visible. These would only be visible to the parkway traveler. It would also mean more roadfill for the parkway where it crosses Tunis Creek. The presence of a tunnel in itself creates variation and change in experience deemed desirable. It avoids the viewing of such large road cuts and reduces the amount of road fill needed to span Tunis Creek valley. Therefore the tunnel option is favored.

SR 416 exit ramp versus U.S. 321 exit ramp: The U.S. 321 exit ramp occurs where many steep cuts at a high visibility location would occur. This would occur on slopes visible from U.S. 321 and where possible development of an aesthetic site is suggested. From an aesthetic standpoint, there is no question that the SR 416 exit ramp is the better option.

East and west option exit ramps for the parkway at U.S. 321: The U.S. 321 option that involves exiting on to Webb Creek Road is much more desirable than exiting U.S. 321 directly. The west option would occur in a very local setting with a small field enclosed by wooded ridges and a rustic streamside road. The east option would occur at a higher speed highway not far from another intersection and at a location where utility wires and private development occupy much of the site's view. The east alternative also places additional, highly visible cuts on a slope facing

U.S. 321. These cuts would be added to parkway cuts already present from the main route of the parkway.

Webb Mountain lower parking area: The proposed parking area occurs within the length of the parkway having a series of excellent panoramas of the GSMNP. It is at the most level and straight location for drivers to stop. It also provides convenient access via a possible short trail to the top of a ridge enabling even better views. The parking lot as proposed is recommended.

Webb Mountain access road and parking loop: The Webb Mountain access road and parking loop would open up the most dramatic panoramas of the GSMNP along Section 8B, if not all of the Foothills Parkway. The top of Webb Mountain provides panoramas to the southwest, south, southeast, north, and northeast. It also provides the experience of being at the peak of a mountain which is not so apparent elsewhere on the Foothills Parkway. The parking loop would also generate negative effects as seen from other locations. These are expected to be within acceptable limits. Therefore, the access road and parking loop atop Webb Mountain are recommended for development.

4.8.7 Overall Analyses Summary

A summary of the positive and negative impacts of the possible alternatives for the Foothills Parkway are discussed below.

4.8.7.1 Positives

The best views of the GSMNP would be captured: this greatly increased the availability of quality scenery to the public. There is no need to develop more sites than those recommended and it may be acceptable to eliminate perhaps 2 or 3 sites from consideration. The lowest priority sites would be 2A, 5C, and 6A. The parkway would make available a visual resource that would be increasingly difficult to secure as development encroaches around the GSMNP. The quality of the views justifies the development of the parkway.

There are no major negative aesthetic impacts to the general public. Views of the parkway from U.S. 321 and other public points do not offer unacceptable aesthetic impacts except perhaps at a few locations where the parkway and U.S. 321 are in close proximity. Road cuts and fills (mainly fills) are the issue.

The parkway alignment tends to maximize views of the GSMNP by being on top of ridges or on the south sides of slopes looking toward the park. The purpose of the parkway is to capture the best possible views of the GSMNP. The 8B alignment tends to do this by looking east or west to view succeeding ridges and the spine of the GSMNP.

4.8.7.2 Negatives

The most negative impacts would be to individual land owners and residences where the parkway appears to pass through their backyard. This is not true all along the parkway but where it does occur, it is a major issue with those people. The cutting of forest, the visual effects of cuts and fills, the noise from parkway traffic, and the feeling of one's privacy being invaded are involved.

Safety and maintenance issues are a concern. The safety issues are most prevalent where interpretive sites and trails would be located near public roads and in floodplains. The safety issues are personal safety, waste management (sanitation), trail identification, and flash floods.

The vegetation maintenance requirements are large from an expense and visual impact perspective. Ten to eleven ha (25 acres) of steep inaccessible slopes and ridge tops is expensive to keep clear. This is particularly true when this land is divided among 11 different sites. Further, the clearing of some of this land is on exposed ridge tops which enhances the negative aspects of cleared forests. The main concerns are around sites 3C and 3D.

Cuts and fills generated by parkway construction would be conspicuous and look bad to viewers for 10 to 20 years if left to natural revegetation. The sites most negatively impacted would be 2A, 3C, 3D, and along large fills in parts of segments 4 and 6. Revegetation or minimization of cuts and fills need innovative solutions to minimize their negative aesthetic impact.

The no-build alternative offers very little opportunity to capture significant scenic resources of the GSMNP. The alternative to the parkway is assumed to be U.S. 321. Views of the park from U.S. 321 are blocked by trees and commercial development. It is also located near the bottom of a valley where views of the park would be difficult to develop.

4.9 CULTURAL RESOURCES

4.9.1 National Register Properties

In the area of Section 8B there is one *National Register*-listed property, the Tyson McCarter Place. This farmstead is within the boundary of the GSMNP south of U.S. 321 and about 0.6 km (0.4 mile) south of the Section 8B ROW (see Appendix N for details). The property is at 555 m (1820 ft) elevation. At its closest point to the Tyson McCarter Place, the centerline of the Section 8B ROW is at an elevation of 600 m (1960 ft). Given the similarities in elevation, the construction of Section 8B may have an adverse visual impact upon the Tyson McCarter Place. The exact visual effect would be dependent upon the grade and cut of the parkway, as well as the level of screening by vegetation. No other *National Register* properties would be impacted by any of the build alternatives of Section 8B.

4.9.2 National Register Eligible Properties

As a result of the Cultural Resources Survey, seven properties appear to meet *National Register* criteria. No audible or visual effects are predicted as a result of the construction and operation of the build alternatives of Section 8B to six of the properties listed below:

Sam Wilson House in Cocke County, CK-55
Laurel Springs Primitive Baptist Church in Cocke County, CK-79
Dr. John Huff Store and Post Office in Cocke County, CK-68
Shults-Williams Farmstead in Sevier County, SV-1090
Shults Grove Methodist Church in Sevier County, SV-1091
Pittman Center Home Economics Building in Sevier County, SV-1544

The G. Torrell Lunsford Cantilever Barn, in Cocke County (CK-B93), is approximately 0.4 km (0.25 mile) northwest of the Big Ridge portion of the Section 8B ROW centerline. At the closest point to the property, the ROW is along the top of Big Ridge at elevations ranging from 520 m (1700 ft) to 560 m (1840 ft) above sea level. The Lunsford barn is within the Chavis Creek valley at approximately 460 m (1520 ft) above sea level. Separating the property from the ROW is a steep slope covered with dense woodlands. Because of the distance and intervening topography, there would be no audible effects to the Lunsford Barn. However, there are potential visual impacts to the property, depending on which side of Big Ridge the parkway were placed on. If it were placed on the western slope of Big Ridge, there would be a potential visual effect. If it were placed on the eastern slope of Big Ridge, there would be no visual effect.

4.9.3 Cultural Landscapes

Three areas were evaluated to determine if they could be considered rural historic landscapes. These areas were the Cosby Valley, Pittman Center, and Rocky Flats. None of the landscapes met the National Register criteria for Rural Historic Landscapes. Therefore, construction and operation of Section 8B would not adversely impact cultural landscapes.

4.10 SUMMARY OF IMPACTS

Listed in Table 68 below is a summary of environmental impacts. The impact summary is organized by resource area for the build and no build alternatives. Potential impacts resulting from options within the build alternative are also summarized.

Table 68. Summary of potential environmental impacts

(1) Build Section 8B of the Foothills Parkway		(2) No Build (No-Action)	
<i>Options within the Build Alternative</i>			
	A. Construct with no interchanges	B. Western terminus (interchange at SR 416 or U.S. 321)	D. Operational timing
	C. Webb Mountain		
	Similar to options A and B.		
	No adverse impacts.		
Resource areas	Similar to option A.		
Geology and soils	Slope instability and exposure of pyritic materials.	Increased soil compaction, surface runoff, and sedimentation and decreased floodplains when compared to option A. The interchange at U.S. 321 would have more impacts than at SR 416, because more cut and fill would be required causing more surface runoff, soil compaction, sedimentation, and erosion, that would negatively impact Webb Creek.	Increased surface runoff and erosion from options A and B.
Water resources	Streambed erosion, water runoff, and sedimentation (especially to Webb Creek, Matthew Branch, Dunn Creek, Carson Branch, and to a lesser extent, the Little Pigeon River). The tunnel option will slightly decrease some of these impacts. Acidification of streams is also possible. Rocky Flats—Impacts from the valley option include soil compaction, sedimentation, and alteration of wetlands. The hillslope option would decrease the impacts of soil compaction and alteration of wetlands, but would have increased erosion and sedimentation to Dunn Creek and associated wetlands.	Spur Road and Overlook Facility—Deterioration of water quality in Matthew Creek due to substantial increases in sediment loading, siltation, runoff from the roadway and parking area, and leachate from septic systems.	No adverse impacts.
			No negative impacts.

Table 68. Continued

(1) Build Section 8B of the Foothills Parkway		(2) No Build (No-Action)			
<i>Options within the Build Alternative</i>					
Resource areas	A. Construct with no interchanges	B. Western terminus (interchange at SR 416 or U.S. 321)	C. Webb Mountain	D. Operational timing	
Aquatic ecology	Turbidity and sedimentation impacts to aquatic communities in streams including Sheep Pen Branch, Copeland Creek, Lindsey Creek, Mill Dam Branch, Warden Branch, Butler Branch, Matthew Creek, Carson Branch, Chavis Creek, and Sandy Hollow Creek.	Similar impacts to option A with additional turbidity and sedimentation impacts in either the Little Pigeon River (SR 416 interchange) or Webb Creek (U.S. 321 interchange) areas. Less impacts to aquatic organisms would be expected with the SR 416 interchange.	Impacts would include those of option A plus additional impacts of construction on Webb Mountain. The lower parking area along the parkway edge would have less impacts on fish and benthic organisms than the spur road/overlook option.	No adverse impacts if the roadway is built and paved immediately. If the roadway is built and not paved sedimentation and turbidity impacts would be expected.	No negative impacts.
	The tunnel option in the Pittman Center area would lessen potential impacts on aquatic organisms.				
	The base of the hillslope option in Rocky Flats would have the lesser impact to aquatic communities in Dunn Creek, Carson Branch, and associated wetlands, compared to the valley option.				

Table 68. Continued

(1) Build Section 8B of the Foothills Parkway		(2) No Build (No-Action)		
<i>Options within the Build Alternative</i>				
Resource areas	A. Construct with no interchanges	B. Western terminus (interchange at SR 416 or U.S. 321)	C. Webb Mountain	D. Operational timing
Terrestrial ecology	Removal of 40 to 120 ha (100 to 300 acres) of forest vegetation and wildlife habitat, increase of wildlife mortality, change of microclimates, decrease in forest habitat and state listed plant species, increase in edge and non-native plant species, impairment of wetlands, and impacts to vegetation from air pollution.	This option would include the same impacts as option A with additional impacts from the construction of the SR 416 interchange to the floodplain habitats of the Little Pigeon River. Less impacts would occur if the U.S. 321 interchange or Alternative 2 (no-action) were employed.	This option would include the same impacts as option A with additional impacts to native vegetation, forest dependent wildlife, and a wetland seep.	No adverse impacts are anticipated unless a delay in final construction also were to delay final revegetation.
Air quality	Habitat may be improved for certain bird species. No potential impacts from particulate matter. Minor contributions to ozone depletion.	The SR 416 option would have the same impacts as option A with more visibility impacts to the Pittman Center area.	This option would have similar impacts as option A.	No significant impacts.
				No negative impacts.

Table 68. Continued

(1) Build Section 8B of the Foothills Parkway		(2) No Build (No-Action)			
<i>Options within the Build Alternative</i>					
Resource areas	A. Construct with no interchanges	B. Western terminus (interchange at SR 416 or U.S. 321)	C. Webb Mountain	D. Operational timing	
Socioeconomics	No significant impacts from additional workforce, traffic, housing, public utilities, or to the existing social structure.	If the SR 416 option is chosen, traffic, population growth, and housing development of the Pittman Center area could increase at a slightly faster rate than with the other interchange options (i.e., U.S. 321 or no interchange). This is especially the case if 8B is opened prior to 8C. This in turn could have a slight impact on Public Services and on local land use patterns and existing community character. Pittman Center could benefit from tax revenues as a result of the SR 416 option.	No significant impacts.	No significant impacts	Housing development and population would continue to grow.
Traffic	Overall, Section 8B would not have any significant environmental or cumulative impacts on traffic. The parkway would alleviate some traffic on U.S. 321.	No significant impact from any of these options.	No significant impacts.	If 8B opened prior to 8C, some minor impacts to SR 416 would occur.	Under this option, traffic on U.S. 321 would become unacceptable near Cosby.
Noise	Some exceedances of FHWA noise standards are anticipated during construction. However, due to the short duration, they are not expected to be significant. With or without the parkway, FHWA noise standards will be exceeded at certain points along U.S. 321.	No significant impacts.	No significant impacts.	No significant impacts.	No negative impacts.

Table 68. Continued

		(1) Build Section 8B of the Foothills Parkway			(2) No Build (No-Action)
		<i>Options within the Build Alternative</i>			
Resource areas	A. Construct with no interchanges	B. Western terminus (interchange at SR 416 or U.S. 321)	C. Webb Mountain	D. Operational timing	
Aesthetics	Disturbance of 25 acres for viewing locations. Tunnel option is favored aesthetically because it avoids large cuts that would be required otherwise.	Options on SR 416 are favored. The option to directly connect to U.S. 321 would have significant adverse aesthetic impacts due to extensive cuts in a very steep area.	Clearing on Webb Mt. would be a adverse aesthetic impact, as the face of Webb Mt. would include serious road cuts initially. These negatives are offset by the panoramic views provided.	No significant impacts.	This alternative would eliminate the negatives of road cuts and the positives of views.
Cultural	Potential significant impacts to the National Register-listed property Tyson McCarter Place could occur. Visual effects would depend upon the grade and cut of the parkway, as well as the level of screening by vegetation. Depending on which side of Big Ridge the parkway is constructed, negative impacts to the G. Torrell Lunsford Cantilever Barn could occur.	No significant impacts.	No significant impacts.	No significant impacts.	No negative impacts to cultural resources.