

VOLUME 1 SUMMARY

In 1994, Oak Ridge National Laboratory (ORNL) was tasked by the National Park Service (NPS) to prepare an Environmental Report (ER) for Section 8B of the Foothills Parkway in the Great Smoky Mountains National Park (GSMNP). Section 8B represents 27.7 km (14.2 miles) of a total of 115 km (72 miles) of the planned Foothills Parkway and would connect the Cosby community on the east to the incorporated town of Pittman Center to the west. The major deliverables for the project are listed below.

Study Plan	August 1994
First Field/Progress Report	October 1994
Second Progress Report	February 1995
Third Progress Report	June 1995
Draft Environmental Report	April 1997
Final Environmental Report	July 1999

From August 1995 through October 1996, NPS, GSMNP, and ORNL staff interacted with Federal Highway Administration (FHWA) staff to develop a conceptual design plan for Section 8B with the intent of protecting critical resources identified during the ER process to the extent possible. In addition, ORNL arranged for bioengineering experts to discuss techniques that might be employed on Section 8B with NPS, GSMNP, and ORNL staff during September 1996.

For the purposes of this ER, there are two basic alternatives under consideration: (1) a build alternative and (2) a no-build alternative. Within the build alternative are a number of options including constructing Section 8B with no interchanges, constructing Section 8B with an interchange at SR 416 or U.S. 321, constructing Section 8B with a spur road on Webb Mountain, and considering operation of Section 8B both before and after the operation of Section 8C. The no-build alternative is considered the no-action alternative and is not to construct Section 8B.

The following summary sections provide information for each resource area concerning the data collected, the timing of such data collection, and the results of the impact assessment.

GEOLOGY AND SOILS

During 1994 and 1995, existing information on geology and soils along the proposed right-of-way (ROW) was compiled and evaluated, and supplemental information was collected to characterize the existing environment in order to evaluate potential environmental impacts of the proposed project. The geology and soils investigation was presented in the April 1997 and in this final ER. As part of the investigation, detailed soil mapping of the entire ROW was completed by a soil mapping expert. The details of this mapping effort are included in Volume 2, Appendix B of the ER (October 1995). A detailed discussion of the geologic impacts is provided in Volume 2,

Appendix A of the ER (October 1995). Specific completed objectives of the geology and soils assessment are as follows:

- verified and augmented published geological and structural data along the proposed route;
- mapped soils within the ROW using National Cooperative Soil Survey Standards and mapped bodies of colluvium and alluvium along the ROW to identify potential problem areas related to slope stability and hydrologically important areas and wetlands;
- collected data on fracture systems present in the bedrock and commented on particular ROW segments that might be affected by combinations of surface dip due to fractures, bedding/cleavage, and rock type; and
- provided impact assessment of engineering properties of the different bedrock types, brittle faults that might cause problems, potential construction hazards in karst areas and relationships to groundwater systems, and pyritic zones which could contribute to stream acidification.

The results of the ER analysis included

- the recommendation to employ all necessary engineering practices (including bioengineering techniques) to all build options to maintain slope stability, control pyritic material, accommodate deeply weathered rock, and to avoid brittle fault zones.

WATER RESOURCES

Thirty stations located on 21 streams were selected for water quality sampling at intervals ranging from monthly to twice during the period from July 1994 to June 1995. This baseline information was used to evaluate the potential for major deterioration of water quality in some areas (particularly surface water acidification as a result of exposure of pyritic materials). A 1-year study (1994-95) of water quality in the area of the Section 8B ROW was conducted to characterize existing, baseline conditions. For streams that cross the ROW but originate outside of it, sampling stations were located at sites upstream and downstream of the ROW (primarily streams in the Pittman Center and Rocky Flats areas). For streams that originate within the ROW, a downstream station was selected (e.g., streams draining Webb Mountain and Big Ridge).

Early results from the monthly sampling showed somewhat higher sulfate levels in the three streams draining the central portion of Webb Mountain than in the other streams sampled. Therefore, a one-time survey sampling of streams draining Webb Mountain was conducted on March 20, 1995 (some stations were collected again in June 1995). In addition to the routine water quality sampling, several instances of storm flow were sampled to evaluate short-term water quality changes resulting from stormflow in selected streams (changes that would not be detected in results from the monthly sampling).

Water quality parameters measured included water temperature, electrical conductance, pH, alkalinity, dissolved oxygen, total suspended sediments, major cations and anions, ammonium, nitrite plus nitrate, soluble reactive phosphorus, trace metals, and mercury. The trace metals and mercury measurements were made quarterly at each station (September, December, March, June) and for one or two storms at each storm sampling station. The water quality measurements were

designed to allow inferences regarding (1) conditions for fish and other aquatic biota, (2) current effects of agriculture and other human activities in the catchments of these streams, (3) the likelihood of the presence of pyritic materials in the ROW, and (4) potential effects of parkway construction and operation on the surface waters. Details of field and laboratory water quality analysis procedures, data, and quality assurance/quality control considerations are included in Volume 2, Appendix C dated August 1995. Impacts from the construction and operation of the Foothills Parkway Section 8B were assessed in the April 1997 and this final ER.

Several recommendations resulted from the ER analysis:

- Erosion control, including bioengineering techniques, for all options is necessary in the Webb Mt. and Rocky Flats areas to mitigate impacts to Webb Creek, Matthew Creek, Dunn Creek, Carson Branch, and to a lesser extent, the Little Pigeon River.
- Bridging is needed over Dunn Creek in the Rocky Flats area.
- Inspection of excavations in the Webb Mt. area are needed to identify sulfide-bearing materials. If identified, these materials should be sealed.
- A septic system not be used in the facilities on Webb Mt. If the Webb Mt. option is employed, restroom facilities should be self-contained and waste transported out. A water quality study (over at least 1 full year) should be conducted just before construction to establish pre-construction, baseline conditions with which to compare conditions during or after construction for determining construction effects.

AQUATIC ECOLOGY

Stream biological surveys were completed at 31 stream sites during the Fall of 1994 to identify aquatic ecological resources along Section 8B. The sampling strategy for both invertebrates and fish was to survey the different taxa from all available habitats. For benthic invertebrates, a standardized qualitative manual collection technique was employed for all 31 stations. For fish, all streams of sufficient water were sampled using various methods of electroshocking.

Two listed species were identified during the surveys: the Allegheny snaketail dragonfly (formerly a C2 federal candidate species found at six of the stream survey sites) and the tangerine darter (a Tennessee state special concern species found at two of the stream survey sites).

Detailed listings of the stream biological data collected are included in Volume 3, Appendix D dated August 1995. Impacts from the construction and operation of the Foothills Parkway Section 8B were assessed in the April 1997 and this final ER.

Recommendations included the following:

- All mitigation measures identified to protect water resources should be instituted.
- Delays in paving road surfaces should be minimized to reduce soil erosion, and turbidity and sedimentation in the streams.

- Culverts or other structures should be constructed in such a way as to ensure that fish movements are not blocked, especially for Copeland Creek, Lindsey Creek, Mill Dam Branch, Warden Branch, Butler Branch, Matthew Creek, Carson Branch, Chavis Creek, and Sandy Hollow Creek.

TERRESTRIAL ECOLOGY

Field surveys for vegetation and wildlife were conducted to determine the presence of federal and state listed, federal candidate, park-rare, and non-native (exotic) species; sensitive habitats; and general characterization of the biota of the ROW. Specific field surveys were done for vascular plants, small mammals, salamanders, reptiles, birds, and bryophytes.

Of the 14 species with federal or state endangered, threatened, previous candidate, or special concern status (including park rare plants, bryophytes, lichens, small mammals and one bird), the populations of the state threatened ovate catchfly and ash-leaved bush-pea are of greatest concern because of their potential global rarity. Although not currently protected, the globally rare population of hornwort is also of concern. Of the sensitive habitats identified or found on the ROW, those of greatest concern are the floodplains of the Little Pigeon River and Cosby Creek; Webb Mountain, including drainages and slopes; wetlands and streams in the Rocky Flat area; and some upper drainages on Big Ridge.

The detailed findings of the wildlife and vegetation surveys can be found in Volume 4 which includes Appendix E—Floral Resources (January 1995), Appendix F—Bird Survey Report (August 1995), Appendix G—Survey Report for Listed Wildlife (February 1995), Appendix H—Bryophyte and Lichen Survey (May 1995), and Appendix I—Wetlands Survey Field Notes (August 1995). Impacts from the construction and operation of the Foothills Parkway Section 8B were assessed in the April 1997 and this final ER.

Results are listed below.

- Forest clearing should be limited as much as possible.
- Disturbed areas should be replanted with native trees.
- Drainages should be bridged rather than leveled with cut and fill.
- For areas of steep slopes and potential erosion, bioengineering techniques should be implemented.
- The Webb Mt. spur road is not recommended. If the spur road is built, no grass shoulders should be used (to minimize forest fragmentation impacts).
- Transplanting of protected plants should be done when possible.
- Construction in wetland areas should be avoided, and erosion and sedimentation mitigation measures discussed under water resources and aquatic ecology should be implemented.

AIR QUALITY

Historic meteorological data and air quality data from various sources in the vicinity of the Foothills Parkway ROW were obtained. These data were then used in a number of models, as appropriate.

The models were employed to help predict potential impacts to air quality as a result of the construction and operation of Section 8B. Models included the Industrial Source Complex Short-term (ISCST3) air dispersion model, EPA VISCREEN visibility model, MOBILE5b, and the CAL3QHC computer model. Results from the models were discussed as part of the impact assessment of the construction and operation of Section 8B in the April 1997 and this final ER.

The air quality assessment identified potential impacts of the proposed project:

- Visibility impacts due to construction would be most apparent during summer months and October.
- Construction activities could result in exceedences of 24-hour PM-10 standards.
- If the tunnel option is chosen, and an accident that blocked traffic occurred, high carbon monoxide concentrations could result in the tunnel.

Mitigation measures were developed to address the potential impacts:

- Construction activities should be minimized during the summer months and October.
- Dust suppression techniques should be employed to limit fugitive dust (including paving parking areas).
- If the tunnel option is chosen, signs should be posted to alert motorists to turn off their engines in case of a stoppage of traffic lasting more than a few minutes.

SOCIOECONOMICS

The impact region of interest for the assessment was defined as Sevier and Cocke counties. Pittman Center and Cosby were identified to be the primary focus of potential environmental impacts as the parkway would affect travel most in those communities. Data concerning population, housing, public services, land use, taxes, economic structure, and social structure were gathered from 1995 to 1997 from various sources and used in the impact assessment of the construction and operation of the Foothills Parkway Section 8B in the April 1997 and this final ER.

The results of the assessment indicate that there would be no significant impacts from additional workforce, traffic, housing, or public utilities or to the existing social structure. If the SR 416 exit 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), particularly if 8B is opened prior to 8C.

TRAFFIC

An initial effort in the traffic study was the collection of data that could be used to establish existing traffic conditions and historical traffic trends in the study area. Traffic volume and turning movement counts were collected at key locations in the study area during the summer and fall peak seasons in 1994. Also, traffic volume and turning movement data collected by ORNL in 1991 for the Section 8B traffic study were compiled. In addition to these data, traffic volume counts were acquired from the NPS, the Tennessee Department of Transportation, and a traffic study conducted by Wilbur Smith Associates (*Sevier Transportation Network Evaluation: Phase I*). Also, historical GSMNP visitation data were obtained from the NPS.

ORNL originally performed a study that projected the potential traffic impacts from the addition of Section 8B only. However, in 1995, the NPS requested that ORNL undertake a regional transportation study to provide a larger contextual analysis of the entire Foothills Parkway from which Section 8B impacts could be assessed. ORNL completed this study in 1996 with direct guidance and input from NPS. The regional traffic study was conducted using standard traffic assignment and capacity analysis methodologies used in the traffic engineering community.

Unacceptable levels of service will occur on numerous roads within and outside of the park increasingly in the future based upon current and future regional growth. However, the results of the traffic assessment indicated that there would be no significant or cumulative impact from the addition of Section 8B or the completion of the Foothills Parkway as a whole within the study area by 2026.

The assessment of potential traffic impacts was presented in the April 1997 and this final ER. Additional data and details collected and used in the ER are presented in Volume 5, which includes Appendix J—Roadway Traffic Volume and Level-of-Service Results for the Five Build Options (August 1995) and Appendix K—Intersection Traffic Volume Results for the Five Build Options (August 1995).

NOISE

In June and July of 1994, ORNL measured existing noise levels at 41 key receptor sites in areas that may be affected by traffic noise along Section 8B as well as other roads in the study area. Key receptor sites included residences, rental properties, churches, schools, and other locations in and around Pittman Center, Cobbly Nob, Rocky Grove, and Cosby.

ORNL used existing traffic and noise measurements, along with the traffic projections generated from this study, to project future traffic noise levels and their impact on ambient noise levels. These noise level projections were calculated using the simple version of the FHWA's Highway Traffic Noise Prediction Model. The results of the noise analysis indicate that impacts would be quite similar for each of the build options and that none of these options should increase noise levels above FHWA standards for residential areas. Therefore, no mitigation measures are recommended for traffic noise.

Because site construction and haul road plans were not available for the Parkway and its intersections with other roads, no analysis of noise related to parkway construction activities was performed. To reduce the impacts of construction noise, a four-step plan was recommended:

1. *Community relations*—Early communication with the public is vital. The public should be informed of any potential construction noise impacts as well as procedures planned to mitigate them. Also, a responsive complaint mechanism should be established and publicized for the duration of the project.
2. *Design considerations*—To the extent possible, construction operations should be located and sequenced to minimize noise impacts near sensitive receptors. Permanent noise barriers planned for the site can be erected early in the construction process to minimize noise, and quieter construction alternatives (e.g., rubber-tired equipment rather than tracked equipment; cast-in piles rather than driven piles) should be used where feasible.
3. *Source control*—Using newer, quieter equipment or equipment with mufflers will often lessen noise impacts.
4. *Site control*—Modifying the time, place, or method of operation for particular noise sources can reduce noise impacts. This usually entails limiting the hours of operation near sensitive receptors.

The assessment of potential noise impacts is presented in this final ER. Additional data and details used collected and used in the ER are in Volume 5, Appendix L—Noise Data (August 1995).

AESTHETIC RESOURCES

The aesthetic resources affected by the proposed Foothills Parkway Section 8B involve viewing opportunities of the GSMNP, specific local viewsheds, scenery to the north, and interpretive opportunities. Factors such as season, time of day, vegetation condition, and traffic affect the value of the potential viewing experience.

An initial approach of evaluating all potential views in detail was taken and provided in the April 1997 ER. Thirty-eight potential views of varying quality and focus were inventoried along the proposed Section 8B alignment. These were evaluated and ranked according to a number of factors including aesthetic value and suitability for development. Thirteen were eliminated from consideration as being too insignificant to develop. Fourteen exhibited some viewing opportunities for passive viewing without significant development. The remaining eleven sites showed the best development potential. Two of these sites contain opportunities for quiet trail development, nature interpretation, or viewing. Three or four contain resources for human settlement interpretation. Five sites offer special opportunities for pull-over parking and scenic views. These eleven sites were treated in detail in the impact assessment of the construction and operation of the Foothills Parkway Section 8B in this final ER.

Several recommendations regarding potential impacts to aesthetic resources were suggested:

- The western exit ramp across the Little Pigeon River should be used.
- The tunnel option east of SR 416 should be selected.
- The SR 416 option rather than the U.S. 321 option should be chosen.

- A ramp should be used at Webb Creek Road if the U.S. 321 option is chosen.
- Both the Webb Mountain lower parking lot and the Webb Mountain loop access road should be built.

Additional details on aesthetic resources methods are included in Volume 5—Appendix M of this final ER.

CULTURAL RESOURCES

A cultural resources assessment for the entire Section 8B ROW was completed in May 1995 to document the architectural, historical, and cultural resources located within the project area. The assessment included evaluation of the potential for cultural (i.e., rural historic) landscapes in the area of the ROW. The cultural resources assessment report is included as Volume 6—Appendix N of the April 1997 and final ERs.

As a result of the assessment, seven properties appear to meet *National Register* criteria. For six of these seven sites, no audible or visual effects were predicted to result from the construction and operation of the build alternatives of Section 8B. Three areas were evaluated to determine if they could be considered rural historic landscapes: the Cosby Valley, Pittman Center, and Rocky Flats. None of these landscapes met *National Register* criteria for rural historic landscapes.

The ER impact analysis resulted in the following recommendations:

- Consideration should be given to screening the parkway in such a way that the Tyson McCarter Place is not visually impacted from the parkway construction or operation.
- The parkway should be placed on the eastern side of Big Ridge to avoid visual effects to the Lunsford Barn.
- Sutton Cemetery should be protected and public access to it should be provided.