Chapter 3

Affected Environment

3.0 AFFECTED ENVIRONMENT

This chapter describes the existing conditions and characteristics in the project area that could be affected by the project alternatives. The characteristics described are those relevant to the assessment of direct, secondary, and cumulative impacts presented in Chapter 4. As appropriate to the assessment of impacts, the information presented under each topic focuses on the project area, the Town of Blowing Rock, Caldwell and Watauga counties in general, or other social and natural regions. The following topics are addressed:

3.1 Population, Economics, and Land Use

This section provides a description of the population, employment, economic, and land use characteristics of the project area. Also included in this section is a discussion of the history of development, housing, comprehensive planning, and farmlands.

3.1.1 History of Development

Blowing Rock

The Town of Blowing Rock has been a summer resort for more than 150 years. Its borders are shown in Figure 1-2 in Chapter 1. By the end of the Civil War, a full-fledged summer resort business had developed in Blowing Rock, and by the late 1800s the town had become one of the

South's main summer resorts, as wealthy families sought to escape the flatland's heat and disease (Buxton, 1989). In 1850, a toll road, currently US 321 and US 321 Business in Blowing Rock?, was built across the Blue Ridge from Lenoir to Blowing Rock, facilitating traffic for tourists and seasonal residents (Caldwell County, 1995). By the late 1800s, railroad expansion opened Blowing Rock to tourists from other areas of the southeastern United States. The Town of Blowing Rock was incorporated in 1889, and continued as a resort community through the 20th century. During the 1970s and the 1980s, the town experienced considerable growth pressure that led town leaders to adopt policies and ordinances to preserve the town's village atmosphere (Watauga County, 1992).

Watauga County

Watauga County experienced growth pressure starting in the late 1960s as Appalachian State University (ASU) expanded and the tourist industry developed. Between 1960 and 2000, the population of the county more than doubled, increasing from 17,529 to 42,695 persons. Despite the growth, Watauga remains a primarily rural county with one major population center (Boone, which contains approximately 32 percent of the county's population). ASU is within the City of Boone and has an enrollment of approximately 14,500 students. Watauga County's population increases by an estimated 10,000 persons during the summer months, with seasonal residents in the towns of Blowing Rock, Seven Devils, and Beech Mountain, as well as in the unincorporated communities of Valle Crucis, Foscoe-Grandfather, Triplett, Aho, Bamboo and Todd (Watauga County, 1992). Most of the project area is in Watauga County (see Figure 1-2 in Chapter 1).

Caldwell County

Caldwell County was organized in 1841. The economy of the county in the early days was based principally on small farms and timber. In 1889, the first modern furniture factories were organized in the county. By 1970, the county had 30 furniture plants and 20 related industries employing 10,216 people. More wood furniture was produced in Lenoir and Caldwell County than any other place in the south, earning Lenoir the nicknames "Furnitureland" and "The Furniture Center of the South" (Caldwell County, 1995). The county's economic base continues to be driven by manufacturing and the furniture industry. A small part of the project area is in northern Caldwell County (see Figure 1-2 in Chapter 1).

3.1.2 Population

Permanent

Caldwell and Watauga Counties experienced continued but slow population growth from 1980 to 2000, as seen in Table 3-1. Caldwell County's population grew 4.4 percent from 1980 to 1990, and 9.5 percent from 1990 to 2000. Watauga County's population grew by 16.7 percent from 1980 to 1990, and by 15.5 percent for the period 1990 to 2000. Blowing Rock, Caldwell County, and Watauga County all grew at a faster rate than the state during the 1970s and 1980s. Since 1990, the rate of growth within Caldwell County has slowed to lower levels than surrounding counties and the State of North Carolina. The census population figures do not include the seasonal/part year residents.

The Town of Blowing Rock experienced little growth in its permanent population until the 1970s, but grew by 66.9 percent during the period from 1970 to 1980. The permanent population of the Town of Blowing Rock has not changed substantially, however, since 1980. The census population figures for Blowing Rock in Table 3-1 include only the permanent population, and not the large seasonal population.

Table 3-1. Permanent Population in Town of Blowing Rock and Caldwell and Watauga Counties

Year	Blowing Rock		Caldwell County		Watauga County		NC
	Population	% Change from the Previous Decade	Population	% Change	Population	% Change	% Change
1950	653	–	43,352	–	18,342	–	–
1960	711	+8.9%	49,552	+14.3%	17,529	-4.4%	+12.2%
1970	801	+12.7%	56,699	+14.4%	23,404	+33.5%	+11.5%
1980	1,337	+66.9%	67,746	+19.5%	31,666	+35.3%	+15.7%
1990	1,257	-6.0%	70,709	+4.4%	36,952	+16.7%	+12.7%
2000	1,418	+12.8%	77,415	+9.5%	42,695	+15.5%	+21.4%

Source: US Bureau of the Census

Seasonal

Blowing Rock's permanent population in 2000 was 1,418 (US Census, 2000). According to the 2000 census, approximately 47 percent of the dwelling units in Blowing Rock are used only seasonally. In 2000, there were 812 permanent dwelling units and 712 seasonal dwelling units. Blowing Rock's population rises to about 10,000 persons in the summer months, as estimated by a Blowing Rock zoning administrator (conversation with Wayne Greene, March 22, 2000).

Population Forecast

The North Carolina Office of State Planning projects that the rate of population growth for Caldwell and Watauga Counties will steadily decrease after 2000, as shown in Table 3-2. While Watauga County's population increased by 15.5 percent (5,743 persons) from 1990 to 2000; the population is expected to increase by 6,076 persons from 2000 to 2020. Caldwell County's population increased by 9.5 percent (6,706 persons) from 1990 to 2000, and the population is expected to increase by 9,841 persons from 2000 to 2020.

Table 3-2. Population Forecasts for Caldwell and Watauga Counties

County	1990	2000		2010		2020	
		Population	% Change 1990-2000	Population	% Change 2000-2010	Population	% Change 2010-2020
Caldwell	70,709	77,415	+9.5%	82,111	+6.1%	87,256	+6.3%
Watauga	36,952	42,695	+15.5%	45,514	+6.6%	48,771	+7.2%

Source: NC Office of State Planning

Social Groups

Table 3-3, Table 3-4 and Table 3-5 present statistics related to the population over the age of 65, non-white population, and persons below the poverty line, respectively, in the Town of Blowing Rock, the two counties (Caldwell and Watauga) and the state.

Table 3-3. Population Above Age 65

Year	Blowing Rock		Caldwell County		Watauga County		North Carolina	
	Total	% of Total Population	Total	Percent	Total	Percent	Total	Percent
1950	**	**	2,168	5.0%	1,192	6.5%	227,468	5.6%
1960	100.[1]	10.2%	3,020	6.1%	1,530	8.7%	314,375	6.9%
1970	166.[1]	12.6%	3,936	6.9%	1,979	8.5%	411,647	8.2%
1980	268	20.0%	6,369	9.4%	3,030	9.6%	605,822	10.3%
1990	300	23.9%	8,549	12.1%	3,931	10.6%	804,341	12.7%
2000	369	26.0%	10259	13.3%	4,683	11.0%	969,048	12.0%

[1] Based on population of Blowing Rock Township, US Bureau of the Census
Source: US Bureau of the Census

Table 3-4. Non-White Population

Year	Blowing Rock		Caldwell County		Watauga County		North Carolina	
	Total	% of Total Population	Total	Percent	Total	Percent	Total	Percent
1950	**	**	2,998	6.9%	228	1.2%	1,078,808	26.6%
1960	2.[1]	0.2%	3,497	7.1%	234	1.3%	1,156,870	25.4%
1970	2.[1]	0.2%	3,574	6.3%	225	1.0%	1,179,038	23.2%
1980	11	0.8%	4,007	5.9%	511	1.6%	1,423,387	24.2%
1990	13	1.0%	4,203	5.9%	1,022	2.8%	1,622,342	24.4%
2000	29	2.1%	6,398	8.3%	1,514	3.6%	2,244,657	27.9%

[1] Based on population of Blowing Rock Township, US Bureau of the Census
Source: US Bureau of the Census

Table 3-5. Population Below Poverty Line

Year	Blowing Rock		Caldwell County		Watauga County		North Carolina	
	Total	% of Total Population	Total	Percent	Total	Percent	Total	Percent
1950	**	**	**	**	**	**	**	**
1960	**	**	**	**	**	**	**	**
1970	**	**	8,122	14.4%	5,703	27.8%	1,026,576	20.2%
1980	176	13.0%	7,046	10.4%	6,251	19.7%	870,501	14.8%
1990	145	11.5%	7,493	10.8%	6,994	18.9%	556,805	8.4%
2000	123	8.7%	8,161	10.5%	6,761	15.8%	958,667	11.9%

** Data not available
Source: US Bureau of the Census

Since 1950, the elderly population in Caldwell and Watauga Counties has closely resembled the percentage of the population above age 65 in the state, marginally increasing over the years. The percentage of population that is elderly in Blowing Rock, on the other hand, has been nearly

twice that of the state average and the surrounding counties since 1980. In 2000, more than a quarter (26.0 percent) of Blowing Rock's population was over age 65.

The percentage of non-white residents in the Town of Blowing Rock, Caldwell County, and Watauga County has remained relatively unchanged since 1950, with each jurisdiction having a much smaller percentage of non-white residents than the State of North Carolina as a whole. According to the 2000 Census, only 29 (2.1 percent) of Blowing Rock's 1,418 permanent residents were non-white, as compared to 8.3 percent for Caldwell County, 3.6 percent for Watauga County, and 27.9 percent for the state.

According to the 2000 Census, since 1970, the percentage of the population below the poverty line (a household income at or below the Department of Health and Human Services poverty guidelines) in Caldwell County has generally been less than for the state as a whole. Watauga County, on the other hand, has had a higher percentage below the poverty line than the state; in 2000, Watauga County had 15.8 percent of the population below the poverty line, compared to 11.9 percent for the state of North Carolina as a whole. The Town of Blowing Rock experienced a slight decrease in the percentage of population below the poverty line from 1990 to 2000, from 11.5 percent to 8.7 percent.

3.1.3 Economics and Employment Trends

Income

Table 3-6 compares median household income for the Town of Blowing Rock, Caldwell County, Watauga County, and North Carolina for the period 1950 to 2000. This data was only available for Blowing Rock for the years 1990 and 2000, and is included for comparative purposes for those two years. In 1990, Blowing Rock had nearly the same median household income ($25,521) as Caldwell County ($25,691) and the State of North Carolina ($26,647), and was 26 percent higher than Watauga County ($20,252). By 2000, Blowing Rock had a substantially higher median household income ($54,271) than Caldwell County ($35,739), Watauga County ($32,611), and the State of North Carolina ($39,184). From 1950 to 1980, the median household income was generally higher for Caldwell County than for the state, and was generally lower for Watauga County. In 1990, the state median household income surpassed that of both Caldwell and Watauga Counties, a trend that continued through 2000. In general, since 1950 the median household income for Caldwell County has been higher than that of Watauga County.

Table 3-6. Median Household Income

Year	Blowing Rock	Caldwell County	Watauga County	North Carolina
1950	**	$2,074	$861	$1,868
1960	**	$4,092	$3,158	$3,334
1970	**	$7,955	$6,149	$7,025
1980	**	$14,552	$11,039	$14,481
1990	$25,521	$25,691	$20,252	$26,647
2000	$54,271	$35,739	$32,611	$39,184

** Data not available
Source: US Bureau of the Census

Employment

In 1997, the total number of employed people in Caldwell County was 29,134. In Watauga County, the 1997 total of employed people was 14,604. The two counties together comprise 1.4 percent of the state's total employment of 3,167,303.

Table 3-7 compares the employment statistics for Caldwell County and Watauga County to the State of North Carolina overall for the years 1977, 1987, and 1997.

In 1997, the employment in Caldwell County was 55.4 percent manufacturing, 18.3 percent wholesale and retail trade, 16.5 percent services, 4.7 percent transportation and public utilities, and 5.1 percent others. The major employment opportunities in Caldwell County were in the manufacture of furniture and textiles. Of the total manufacturing jobs, 57.6 percent were in furniture. Textiles, a major industry in North Carolina, play a smaller role in the Caldwell County economy with 8.2 percent of the manufacturing sector market. Overall the county's economy has been highly dependent on the furniture and textiles manufacturing industries, which are responsible for over one third of all jobs in the county.

Table 3-7. Employment by Sector

Sector	Caldwell County			Watauga County			North Carolina		
	1997	1987	1977	1997	1987	1977	1997	1987	1977
Total	29,134	25,997	23,460	14,604	9,292	6,381	3,167,303	2,398,725	1,726,816
Agricultural services, forestry, and fishing	(b)	23 (0.1%)	(a)	91 (0.6%)	39 (0.4%)	25 (0.4%)	21,898 (0.7%)	11,219 (0.5%)	5,013 (0.3%)
Mining	(a)	(b)	(a)	33 (0.2%)	(b)	(a)	3,827 (0.1%)	3,813 (0.1%)	4,682 (0.3%)
Construction	920 (3.2%)	941 (3.6%)	623 (2.7%)	1,076 (7.4%)	653 (7.0%)	380 (6.0%)	197,727 (6.2%)	151,909 (6.3%)	104,034 (6.0%)
Manufacturing	16,130 (55.4%)	16,243 (62.5%)	16,684 (64.2%)	1,312 (9.0%)	1,519 (16.3%)	2,080 (32.6%)	835,919 (26.4%)	844,253 (35.2%)	756,088 (43.8%)
Transportation and public utilities	1,380 (4.7%)	1,058 (4.1%)	816 (3.5%)	492 (3.4%)	402 (4.3%)	245 (3.8%)	164,300 (5.2%)	136,288 (5.7%)	94,042 (5.4%)
Wholesale trade	921 (3.2%)	562 (2.2%)	829 (3.5%)	470 (3.2%)	331 (3.6%)	412 (6.5%)	183,702 (5.8%)	143,053 (6.0%)	109,899 (6.4%)
Retail trade	4,414 (15.2%)	3,747 (14.4%)	2,259 (9.6%)	5,272 (36.1%)	3,264 (35.1%)	1,615 (25.3%)	649,837 (20.5%)	485,382 (20.2%)	298,246 (17.3%)
Finance, insurance, and real estate	485 (1.7%)	404 (1.6%)	300 (1.3%)	536 (3.7%)	630 (6.8%)	283 (4.4%)	174,802 (5.5%)	128,635 (5.4%)	90,410 (5.2%)
Services	4,812 (16.5%)	2,952 (11.4%)	1,929 (8.2%)	5,321 (36.4%)	2,401 (25.8%)	1,315 (20.6%)	934,520 (29.5%)	488,990 (20.4%)	262,531 (15.2%)
Unclassified establishments	(a)	(b)	–	1	(b)	(a)	771	5,183 (0.2%)	1,881 (0.1%)

Note: Excludes most government employees, railroad employees, and self-employed persons. Percentages represent share of total employment.

(a) 0-19 employees
(b) 20-99 employees
Source: County Business Patterns, US Census Bureau

For the past three decades, Watauga County has had a diversified economic base, comprised of manufacturing, retail, educational, service, and tourism. Since 1981, the county has been losing a substantial number of its manufacturing jobs because of plant closings and cutbacks. By 1997, as shown in Table 3-7, manufacturing accounted for only 9.0 percent of the employment in the county. The largest sector of the work force was retail/wholesale trade with 39.3 percent of the jobs, followed by services at 36.4 percent, 7.3 percent construction, and 8.0 percent others.

Employment in Blowing Rock and its immediate environs is primarily retail and service-oriented.

Tourism and Retail

The tourism and retail sectors have experienced extraordinary growth during the past 20 years, offsetting the losses in manufacturing. The population of Blowing Rock swells from approximately 1,600 (including some temporary residents) during the off-season, up to 10,000 (as described above under "Seasonal") during the summer months. This dramatic increase is because of the influx of short-term vacationers who rent vacant or for-rent housing units for short periods of time, as well as the return during summer months of homeowners who live elsewhere during the off-seasons, leaving their homes vacant during those periods of absence.

Tourism accounts for approximately 2,430 jobs in Watauga County that cumulatively earned over $31 million in 1997. Tourists spent over $120 million in the same year and tourism contributed $4.12 million in local tax revenue. Approximately 25 percent of the jobs in Watauga County are tourism-related. Blowing Rock has sponsored or supported numerous tourism-related events and attractions to nurture this important sector of the local economy, including Art in the Park exhibitions, Independence Day festivities, Blowing Rock Stage Company performances, and others.

Although tourism brings in large amounts of revenue for the county, many of the tourism-related jobs are low paying and seasonal. Some residents are forced to seek employment outside the county because they can no longer afford to live there on low wages.

Blowing Rock has developed into a foremost recreational destination. The old downtown area includes a myriad of craft boutiques, antique shops, and restaurants that contribute to Blowing Rock's small town charm and draw many to stay there each year. The Green Park Inn, established in 1882, and the Blowing Rock Country Club golf course serve as an anchor for the National Register of Historic Places-listed Green Park Historic District.

One attraction is *The Blowing Rock*, named for a Cherokee legend and lends its name to the town. According to the legend, when an object is thrown from this rock, it is said to be blown directly back by winds, resisting gravity's pull. As one of North Carolina's oldest attractions, the site brings people to Blowing Rock year round. The site offers spectacular views of the valley below.

The Town of Blowing Rock has over 80 hotels, motels, inns, and resorts ranging from rustic to extravagant. In addition to the Green Park Inn, one of the oldest accommodations that brings repeat customers is the Chetola Mountain Resort, founded in 1846 as a privately owned recreational and therapeutic estate. The Chetola Resort is immediately west of the intersection of US 321 and US 221, bordered on the east by Lake Chetola and the "Shoppes on the Parkway" shopping center. While the hotel business is slow during the early winter and spring, these establishments are largely booked for the duration of the summer and into fall, when tourists come to view the fall foliage. Bookings may or may not be heavy during the ski season, depending on weather conditions.

Blowing Rock offers over 30 restaurants, again reflecting the high rate of tourism. Like many of the shops along Main Street, a substantial percentage of these restaurants are seasonal, usually open from May through October. During the winter, the town caters to a smaller, but consistent, stream of visitors who come to ski at one of the local mountains. There are five resorts in the region, as well as the French-Swiss Ski College.

In addition to hosting short-term visitors, Blowing Rock has a sizable second home market. The 2000 Census lists 46.7 percent of the housing units in Blowing Rock as vacant for seasonally, recreational, or occasional use. Real estate sales in Watauga County amounted to $39,795,500 in 1999 alone, up from $9,759,200 in 1990. Further, Blowing Rock building permit values increased from $5,021,724 in 1990 to $16,193,120 in 1999.

The "Shoppes on the Parkway," at the intersection of US 221 and US 321 in Blowing Rock, is a discount shopping mall. The mall is similar to many that have been developed throughout the United States, typically in areas of high tourism. A substantial share of the sales activity at this mall is tourist-oriented.

The single largest employer in Watauga County is Appalachian State University (ASU), north of the project area in the City of Boone. The Watauga County Economic Development Commission estimated the annual economic impact of the University at $407 million in 2000.

Housing Growth in Blowing Rock and Caldwell and Watauga Counties

Population growth in the Town of Blowing Rock, Caldwell County and Watauga County has been accompanied by new housing development. Table 3-8 shows the growth of total housing units in Caldwell County and Watauga County from 1950 to 2000 and in the Town of Blowing Rock from 1980 to 2000. A surge in new housing units in Caldwell County and Watauga County between 1970 and 1980 corresponds to a substantial increase in population during this time period.

Table 3-8. Housing Units in Town of Blowing Rock and Caldwell and Watauga Counties

Year	Blowing Rock		Caldwell County		Watauga County	
	Total	% Change Since Last Decade	Total	% Change	Total	% Change
1950	**	**	11,082	–	4,945	–
1960	**	**	13,870	+25.2%	5,554	+12.3%
1970	**	**	18,064	+30.2%	8,595	+54.8%
1980	1,214	–	25,557	+41.5%	14,662	+70.6%
1990	1,427	+17.5%	29,454	+15.2%	19,538	+33.3%
2000	1,524	+6.8%	33,430	+13.5%	23,155	+18.5%

** Data not available
Source: US Bureau of the Census

When comparing the Town of Blowing Rock's population between 1980 and 2000 (Table 3-1) to the growth in housing units during the same period, it appears that most of the increase in housing units is related to seasonal housing. The number of housing units increased by 213 (17.5 percent) while the permanent population decreased by 80 persons (6 percent). By 2000, the growth in housing units increased at a rate closer to that of the permanent population.

Building Permits

As shown in Table 3-9, the number of single-family residential building permits issued annually by the Town of Blowing Rock increased from nine in 1990 to 38 in 1998, reflecting the steady increase in permits issued in both Caldwell and Watauga counties and statewide. In this same period, the number of permits issued in North Carolina more than doubled. The number of building permits issued in Blowing Rock declined in 1999 and 2000 to 27 from a 1998 high of 38, but remained consistently higher than the number issued prior to 1996.

Table 3-9. Single-Family Building Permits Issued (Percent Change from Previous Year)

Year	Blowing Rock	Caldwell County	Watauga County	North Carolina
1990	9 (–)	276 (–)	248 (–)	30,471 (–)
1991	17 (+88.9%)	273 (-1.0%)	263 (+6.0%)	30,648 (+5.8%)
1992	16 (-5.9%)	305 (+11.7%)	299 (+13.7%)	38,896 (+26.9%)
1993	12 (-25.0%)	348 (+14.1%)	318 (+6.4%)	42,675 (+9.7%)
1994	15 (+25.0%)	286 (-17.8%)	295 (-7.2%)	46,425 (+8.8%)
1995	17 (+13.3%)	322 (+12.6%)	307 (+4.1%)	47,182 (+1.6%)
1996	17 (+0.0%)	368 (+14.3%)	339 (+10.4%)	51,441 (+9.0%)
1997	27 (+58.8%)	310 (-15.8%)	346 (+2.0%)	54,654 (+6.2%)
1998	38 (+40.7%)	346 (+11.6%)	381 (+10.1%)	61,319 (+12.2%)
1999	27 (-28.9%)	448 (+29.5%)	461 (+30.0%)	62,616 (+2.1%)
2000	27 (0.0%)	Not Available	Not Available	Not Available

Source: Town of Blowing Rock and North Carolina Department of Labor

Housing Value

Because US Census data for housing values only accounts for owner-occupied units, information on the average value of all housing units in the counties and Town of Blowing Rock is not available. But the US Census data does indicate that Caldwell County and Watauga County experienced a substantial increase in the median value of owner-occupied housing between 1970 and 1980 (187.9 percent and 205.7 percent increase from ten years previous, respectively), as shown in Table 3-10. These increases are consistent with the increase seen

Table 3-10. Housing Values in Town of Blowing Rock and Caldwell and Watauga Counties

Year	Blowing Rock		Caldwell County		Watauga County		North Carolina	
	Median Value	% Change	Median Value	% Change	Median Value	% Change	Median Value	% Change
1950	**	**	$3,804.[1]	–	$4,765.[1]	–	$4,901.[1]	–
1960	**	**	$6,300.[2]	+65.6%	$9,000.[2]	+88.9%	$8,000.[2]	+63.2%
1970	**	**	$10,700.[2]	+69.8%	$14,100.[2]	+56.7%	$12,800	+60.0%
1980	$53,000.[2]	–	$30,800.[2]	+187.9%	$43,100.[2]	+205.7%	$36,000	+181.3%
1990	$98,400	+85.7%	$51,600	+67.5%	$73,200	+69.8%	$65,800	+82.7%
2000	$252,000	+156.1%	$86,700	+68.0%	$139,300	+90.3%	$108,300	+64.6%

[1] Owner-occupied 1 dwelling-unit properties, US Bureau of the Census
[2] Owner-occupied units, US Bureau of the Census
**Data not available
Source: US Bureau of the Census

across the state as a whole (181.3 percent) during that period. Since 1950, the median value of owner-occupied housing in Caldwell County has generally been lower than the North Carolina median value, while Watauga County's median house value has been slightly higher than the state median value. In 2000, the median value of owner-occupied houses in the Town of Blowing Rock was $252,000, compared to $108,300 for the state.

Vacancy Rates

Vacancy rates, shown in Table 3-11, also provide insight into the growth of seasonal housing in the Town of Blowing Rock and Caldwell and Watauga counties. These rates are based on the number of housing units that are not occupied when the US Census is taken (in April) compared to the total number of housing units. Vacancies do not necessarily indicate a seasonal housing unit, but they do serve as a reasonable measure, particularly when weighed against the state vacancy figures. A comparison to the state's vacancy rate of 11.1 percent in 2000 reveals the significance of seasonal housing, especially in Blowing Rock and Watauga County. The proportion of vacant residences in Watauga County (28.6 percent) was 2.5 times the state rate (11.1 percent) in 2000, while the proportion of vacant residences in Blowing Rock (56.7 percent) was approximately five times the state rate.

Table 3-11. Housing Vacancy Rates in Town of Blowing Rock and Caldwell and Watauga Counties

Year	Blowing Rock		Caldwell County		Watauga County		North Carolina	
	Housing Units	% Vacant	Housing Units	% Vacant	Housing Units	% Vacant	Housing Units	% Vacant
1980	1,227	33.7%	25,557	6.4%	14,662	17.4%	2,274,737	8.0%
1990	1,427	60.9%	29,454	7.7%	19,538	29.9%	2,818,193	10.7%
2000	1,519	56.7%	33,430	8.0%	23,155	28.6%	3,523,944	11.1%

Sources: US Bureau of the Census, NC Data Center, Region D Council of Governments

3.1.4 Existing Land Use

Project Area Summary

The project area is in western North Carolina and encompasses a part of northern Caldwell County and a part of southern Watauga County, including the resort community of Blowing Rock. Land use in the project area includes scattered rural residential development in Caldwell County and eastern Blowing Rock, as well as concentrated low-density residential, commercial, and recreational development in Blowing Rock both east and west of US 321. Within Blowing Rock, US 321 passes through the Green Park Historic District, which is listed in the National Register of Historic Places. US 321 passes adjacent to the Green Park Inn and the Blowing Rock Country Club golf course, which are included in the historic district. Development along US 321 in the southern portion of Blowing Rock is primarily low-density residential, while the primary development along US 321 in the northern portion of Blowing Rock is commercial. Development in Blowing Rock off of US 321 is primarily single-family residential. The Blue Ridge Parkway is to the north of Blowing Rock. Within Caldwell and Watauga Counties the Blue Ridge Parkway provides a significant source of recreational open space for local residents and national visitors to the area. The Parkway is eligible for listing on the National Register of Historic Places. The Blowing Rock Assembly Grounds is adjacent to the Parkway. Between the Blue Ridge Parkway and Aho Road (the northern boundary of the project area), the small amount of development is primarily rural residential. Along US 321, between the Parkway and Aho Road, there are a few commercial establishments on the east side. At the intersection of US 321 and Aho Road, there is a mobile home park. A generalized land use map is presented in Figure 3-1.

Existing Land Use

Residential. The principal concentration of residential development in the project area is in the Town of Blowing Rock. Residential densities are the greatest there, and in many instances shrubbery, ornamental trees and private fences are directly adjacent to US 321. Approximately 82 single-family dwellings within Blowing Rock are in proximity (either direct access or second tier lots) to US 321. Most are within 1.3 miles of the town's southern limits (south of US 321 Business). Twenty-six residential units have direct access to the existing US 321 right-of-way within Blowing Rock. Setbacks from the roadway vary from 50 feet to 250 feet. The majority of the residential structures along US 321 are free standing single-family dwellings, although some units are multifamily. The condition of the dwelling units varies widely, although the majority are in good condition. The project area to the east of US 321 is primarily low density residential, including the Green Hill and Wonderland Drive neighborhoods.

A few multifamily dwellings are in Blowing Rock along US 321. The six-unit Blackberry Ridge condominium is on US 321, 1/2 mile south of the Watauga/Caldwell County border. Two multifamily dwellings are adjacent to US 321 on the west side at its intersection with Pinnacle Avenue and Fairway Villas condominiums are on the opposite side of US 321.

The Bailey Camp community is approximately 1.5 miles south of Blowing Rock, near the southern terminus of the project area. About six residences are close to the existing roadway in this area. Scattered rural homes are on the hillside overlooking Blackberry Valley near US 321. Two families live along Thunder Mountain Road north of the Blue Ridge Parkway. At the intersection of US 321 and Aho Road, there is a mobile home park.

Commercial. Approximately 41 commercial establishments are along US 321 in Blowing Rock. They are highway-oriented businesses, including gas and convenience stations, gift and craft stores, hotels, restaurants, grocery stores, and furniture stores.

Figure 3-1. Existing Land Use

Within Blowing Rock, the Green Park Inn is a prominent business establishment and a historic structure. Access and parking for the Inn are adjacent to US 321 and across US 321 from the Inn. The Blowing Rock Country Club and golf course, in proximity of the Green Park Inn, are also adjacent to US 321. North of the Green Park Inn, the fourth hole of the current 18-hole course is adjacent to the eastern border of US 321.

Other Blowing Rock commercial properties that are near US 321 and south of its juncture with US 321 Business are the Gideon Ridge Inn (high on a ridge, with no direct access to US 321) and Canyon's of the Blue Ridge Restaurant at the intersection of Pinnacle Avenue and US 321. Between its two junctures US 321 Business and with US 221, US 321 has approximately 33 commercial establishments, including motels, restaurants, a community shopping center, gift stores, gas stations, and offices. The Shoppes on the Parkway outlet mall is just north of the intersection with US 221.

Industrial. No industries exist within the project area.

Institutional. The Blowing Rock Elementary School is outside of the project area on Sunset Drive between US 321 and US 321 Business in Blowing Rock, approximately 1,300 feet west of US 321. No public schools are within the project area.

Eight churches are along or near US 321, or are within the general project area. They are:

- Church of the Epiphany
- United Church of Christ, Blowing Rock Assembly Grounds
- Bethany Baptist Church
- St. Mark's Lutheran Church
- Bailey Camp Missionary Baptist Church
- Church of God in Blowing Rock
- Christian Science Society in Blowing Rock
- First Independent Baptist Church

One cemetery, the Greene Cemetery, is near the US 321 right-of-way in Caldwell County, just north of and across from St. Mark's Lutheran Church, at the southern end of the project area.

3.1.5 Comprehensive Planning

Caldwell County, Watauga County and the Town of Blowing Rock all have comprehensive land use plans that guide development within the project area. Caldwell County and Blowing Rock have zoning ordinances, while Watauga County has not adopted a zoning ordinance. The following provides a description of the planning objectives and the future land use goals of each of these jurisdictions, as defined in the respective comprehensive plans. Figure 3-2 illustrates the combined zoning classifications for the project area.

The Blue Ridge Parkway also conducts comprehensive land use planning for guiding development within its boundary. There are strategic and annual work plans that guide management of the Parkway and the park is currently preparing a general management plan that is very similar to a county comprehensive land use plan.

Figure 3-2. Generalized Blowing Rock, Watauga County and Caldwell County Zoning

Caldwell County

Caldwell County has an official countywide zoning ordinance and zoning map. The US 321 corridor is zoned R-R (Rural-Residential). The regulations of this district are intended to discourage any use that, because of its character, would substantially interfere with the development of single family residences in the district and would be detrimental to the quiet residential nature of the areas included within this district. Manufactured homes are not allowed within this district. In general, uses that are permitted include: single-family dwellings with a minimum lot area of 20,000 square feet (0.46 acre); accessory buildings to residential uses; agriculture or horticulture; churches; and home occupation businesses. Existing businesses and mobile homes are classified as non-conforming uses. The area in Caldwell County that is east of US 321 is zoned RA-20 (Residential – Agricultural District). The principle use of land within this district is for residential and agricultural purposes. Modular homes and manufactured homes are permitted uses.

Caldwell County's Comprehensive Plan was adopted in 1995. The plan notes that the county has experienced steady growth over the last 100 years and has shifted from an agricultural economy to an industrial economy. Agriculture still plays an important role in the county's economy, however, particularly in the southern portion of the county. The plan anticipates that limited residential development will occur to the extreme north near the Watauga/Caldwell County line at Blowing Rock, and that commercial development potential is closely related to residential land use. According to the plan, much of the commercial development is projected to occur in or near Lenoir and Hudson along the major transportation routes, well away from the project area. Development is limited in the project area because of the lack of available sites with both water and sewer services and appropriate zoning requirements. The Comprehensive Plan also contains a series of broad, long-range objectives for the future development of Caldwell County. Among these goals are the following, which relate to the US 321 improvements project:

- Coordinate the physical, economic and social development of Caldwell County;
- Provide an environment for living encompassing all the institutions, services and facilities necessary for the convenience and well-being of residents;
- Encourage a unified approach to the related problems and potentials of physical development that will promote the general welfare of the residents of Caldwell County; and
- Provide a comprehensive system of streets and highways coordinated with the pattern of land use to achieve the safe, efficient movement of people and goods in the County.

Watauga County

Watauga County does not have a countywide zoning ordinance, but does have a comprehensive plan, adopted in 1992. The purpose of the plan is "to stimulate actions which will improve or enhance the overall quality of life in Watauga County." As part of the Comprehensive Plan process, citizens identified the county's strengths and weaknesses. Among the county's most commonly cited strengths were: aesthetics, the environment, natural beauty, clean air and water, friendly people, recreation, services, and the presence of ASU. The two most common weaknesses identified were transportation and over development, or uncontrolled growth. These

strengths and weaknesses helped to identify key issues, which were in turn addressed by county goals. The following general goals were established:

- Preserve and improve the physical environment, especially water quality;
- Protect and maintain the rural atmosphere and visual quality of the county;
- Strive for a stable, balanced local economy; and
- Improve transportation in the county.

Blowing Rock

The Town of Blowing Rock has a zoning ordinance and zoning map. The zoning districts along US 321 are R-15 (low density residential), R-10M (medium density residential) and R-6M (high density residential) residential from the southern town limits to US 321 Business, and general business (GB) between US 321 Business and US 221. The eastern part of town, including the Green Hill Road and Wonderland Drive areas, are zoned R-15. (See Figure 3-2.) The R-15 zoning district is intended to be a low-density residential district in which single-family residences constitute the predominant use. The R-10M district is a medium density residential district in which multi-family residences are the primary use. The R-6M district is a higher density residential district in which two-family and multi-family residences predominate. The GB district is designed to accommodate the widest range of commercial activities permitted within the town, particularly those that are auto-oriented (Town of Blowing Rock, 1999).

The Blowing Rock Comprehensive Plan (2004) contains policy statements for the future growth, development, and protection of the quality of life for the town's residents. The policy statements in this plan address residential development, natural resources and historic preservation, recreation and cultural resources, economic development, and community services. It also contains a plan implementation and maintenance schedule.

The overall direction of the document is the preservation of the resort village character of Blowing Rock. According to the plan, the town is characterized by natural scenic beauty and historic village atmosphere and that character should be the standard for determining the "appropriateness" of new development in the administration of land use codes. The plan stresses the preservation of historically significant buildings, walls, and other structures, as well as the preservation of the characteristic natural vegetation. Additionally, the plan specifically addresses the nature of commercial development in the town, focusing on the necessity of maintaining the "upscale" appearance and character of the community.

The plan also calls for improvements to US 321 from US 321 Business to US 221. The plan states that the roadway ". . . should be improved to include curb and gutter, sidewalks, coach lights, landscaping, and proper NCDOT standard driveway connections with curb stops to promote the village character and public safety." The plan does not specify a recommended number of travel lanes.

Blue Ridge Parkway

While the Blue Ridge Parkway has no zoning or management jurisdiction that extends beyond the boundary it does greatly influence the local tourism economy, transportation system

improvements and recreational open space for local communities. The parkway's strategic plan and corridor management plan set forth several purposes for which the Parkway is managed:

- Physically connect Shenandoah and Great Smoky Mountains National Parks by way of a "national rural parkway"- a recreational destination-oriented motor road traveling through a variety of scenic ridge, mountainside and pastoral farm landscapes.

- Manage the scenic, natural and cultural resources of the Parkway's designed and natural areas to preserve the integrity of resources and to provide a quality visitor experience.

- Influence the protection of the scenic, natural and cultural resources of the Parkway's designed and natural areas to preserve the integrity of resources and to provide a quality visitor experience.

- Conserve and provide for the enjoyment and understanding of the natural resources and cultural heritage of the Central and Southern Appalachian Mountains.

- Provide opportunities for visitors to experience the scenic qualities, recreational uses and natural and cultural resources of the Blue Ridge Parkway and its corridor.

3.1.6 Farmlands

The US Department of Agriculture, Natural Resource Conservation Service (formerly Soil Conservation Service) has identified three general categories of important farmland soils -- prime, unique, and statewide and local important. Prime farmlands consist of soils that are best suited for producing food, forage, fiber, and oilseed crops. Such soils have properties that are favorable for production of sustained high yields with minimal inputs of energy and resources. Farmland of statewide and local importance consists of soils that do not meet all of the requirements for prime farmland because of steepness of slope, permeability, susceptibility to erosion, low available water capacity, or some other soil property. Statewide and locally important farmland, however, is considered valuable in the production of crops when managed according to modern farming methods, including drainage to control excess water. Soils that have a special set of properties that are unique to producing certain high-value crops meet the requirements for unique farmland.

About seven percent, or 20,686 acres, of Caldwell County meets the requirements for prime farmland. There is no statewide or locally important farmland in Caldwell County. About 2.5 percent, or 5,140 acres, meets the requirements for prime and statewide (but not locally) important in Watauga County. There is no prime, statewide, or locally important farmland within the project area.

3.2 Neighborhoods and Community Services

3.2.1 Communities and Neighborhoods

Caldwell County

The Caldwell County portion of the project area is in Patterson Township and consists primarily of the Blackberry Valley/Bailey Camp community area. Patterson Township, as a whole, is predominantly white (99 percent), with an elderly population of 13 percent and a low-income population of 12 percent. These figures are slightly higher than those for the county as a whole

(US Census, 2000). The median household income for the township is $21,767 compared to $25,691 for Caldwell County.

Blackberry Valley/Bailey Camp Community Area. The Blackberry Valley/Bailey Camp communities are sparsely populated and rural, consisting largely of farms and forest. The area, approximately 1.5 miles southeast of Blowing Rock, is traversed by unpaved, narrow, winding roads with sections of steep grades. The two primary roads are Blackberry Road and Bolick Road. Blackberry Road is paved. Most homes are in the valleys, although some are clustered on ridges and upland slopes. Community facilities include two churches, a school and a "country" store. Several cemeteries are in the area. Along US 321, one can find a few single-family homes and the former Valley View Motel (renovated for condominiums), which overlooks Blackberry Valley. Blackberry Ridge condominium, a six-unit multi-family structure, is on the east side of US 321 north of this area.

Blowing Rock. The southern end of Blowing Rock is in Caldwell County and consists primarily of low-density, single-family units west of US 321.

Watauga County

The Watauga County portion of the project area consists primarily of the Town of Blowing Rock and the area north of the Blue Ridge Parkway. The town is approximately 99 percent white, with an elderly population of 24 percent (compared to 96.5 percent and 11 percent, respectively, for Watauga County). According to the Blowing Rock zoning administrator, the seasonal population is as high as 10,000, just over seven times the permanent population in 2000. Census figures indicate that 46.7 percent of the dwelling units in Blowing Rock are vacant for seasonal, recreational, or occasional use In 2000, the median income for Blowing Rock was $54,271 compared to $32,611 for Watauga County (US Census, 2000).

Green Hill/Green Hill Road Area. This area of Blowing Rock consists primarily of single-family second homes, many overlooking the Blackberry Valley/Bailey Camp area. Traveling north on Green Hill Road nearing the Blue Ridge Parkway, development transitions into a more rural, farm community. New second home subdivisions are developing adjacent to Green Hill Road. The Blowing Rock Country Club golf course and a church are also in this area.

The farming community near the north end of Green Hill Road includes the Craig farm. The Craig property is adjacent to the Blue Ridge Parkway on Green Hill Road and between the Blue Ridge Parkway and Blowing Rock Assembly Grounds and north of the Parkway. The property was split in 1935 when right-of-way was acquired for the Blue Ridge Parkway. The construction of Green Hill Road and Wonderland Drive further divided the original property. Descendants of the Craig family own individual homes in the area.

Wonderland Drive Area. This area lies between Green Hill Road and Goforth Road. Many of the homes along this winding, paved road are adjacent to the golf course, and much of the land along it was subdivided for residential development, and new local streets have been built, in the last seven years.

Possum Hollow Road Area. This area, east of US 321, extends from Sunset Drive to the US 321/Shoppes on the Parkway intersection. It contains a mixture of old and new homes and some commercial properties near the intersection of Possum Hollow Road and US 321. An electrical substation is also near this intersection. The First Independent Baptist Church, the former Blowing Rock Negro Community Church, is near Possum Hollow Road. The entrance to the Hillwinds Estates subdivision is on Possum Hollow Road.

Thunder Mountain Road/Aho Road Area. This area lies just north of the Blue Ridge Parkway and includes a cluster of homes on Thunder Mountain Road and its environs and a mobile home park on Aho Road at its intersection with US 321. Near the Parkway, the area consists largely of farmland and forest.

3.2.2 Community Facilities and Resources

Schools

No schools are on US 321. Blowing Rock Elementary School is on Sunset Drive, between US 321 and US 321 Business. Existing school bus routes for both the elementary school and Watauga High School in Boone use US 321. The school buses load and unload children at designated bus stops along US 321. The buses frequently enter and exit US 321, but because of the arrangement of the route, the children do not need to cross the roadway to load or unload.

Public Transportation

AppalCART, a federally and locally subsidized transportation service in Boone, serves ASU and provides access for the elderly to shopping areas. Although service to Blowing Rock is not a designated AppalCART route, a partnership between AppalCART and a local Human Service agency provides a van for morning and afternoon service, Monday through Friday and a mid-morning and mid-afternoon service on Mondays, Tuesdays and Fridays. Ridership averages six passengers per trip. Currently there is no commercial bus service to Blowing Rock. As of 2004, Greyhound Lines, Inc. is considering reestablishing a discontinued service from Charlotte to Boone via US 321; however, it is not known whether a station will be placed in Blowing Rock.

Hospitals

Hospitals that serve the project area are:

- Blowing Rock Hospital in Blowing Rock;
- Watauga County Hospital in Boone; and
- Caldwell Memorial Hospital in Lenoir.

No hospitals are on US 321.

Fire and Police Protection

Blowing Rock has one volunteer fire station that serves a five-mile radius around the town, including the area in the North Caldwell Fire Services District. The station is on Park Avenue, a block west of US 321 Business and adjacent to the Police Department and City Hall. The Town of Blowing Rock has identified and purchased a parcel on the east side of US 321 south of Sunset Drive for a new fire and emergency medical service station. The new station will increase the volunteer fire department's ability to respond in a timely manner to emergencies. Blowing Rock has ten police officers, whose jurisdiction is within the Blowing Rock town limits. Police protection along the remainder of the corridor is provided by the Caldwell County and Watauga County Sheriff's Departments.

Ambulance Service

The Town of Blowing Rock has 15 trained volunteers, three ambulances, and a crash truck, serving a 5-mile radius around the town. Secondary response service is provided by Watauga County Emergency Medical Service (EMS) in Boone. The Lenoir Ambulance Service and the

Caldwell County Protective Services Department are responsible for the remainder of Caldwell County along US 321.

National Parks System Units

The Blue Ridge Parkway is administered as a national Parkway by the National Park Service, an agency of the federal government. Some 26.5 miles of the Blue Ridge Parkway traverses Watauga County offering 55 view areas - 17 overlook parking areas and 38 roadside vistas. Just south of the current US 321 crossing of the Parkway is the 3500-acre Moses Cone Memorial Park that is also administered by the Blue Ridge Parkway. Only two view areas are directly affected by the bypass alternatives, while no other Parkway visitor facilities are within the alternative corridors.

National Forest

South of US 321 Business, the Pisgah National Forest lies to the west of this section of US 321. The Grandfather Ranger District of the Pisgah National Forest includes 187,000 acres that are between I-40 at Ridgecrest, North Carolina, and US 321 near Blowing Rock, and between the Blue Ridge Parkway and the foot of the mountains to the south of the Parkway. No formal recreation areas or facilities in the forest are near US 321. The national forest is west of private property abutting US 321. Thus, no part of the national forest lies within the alternative corridors.

3.3 Minority and Low-Income Populations

3.3.1 Minority and Low-Income Definitions

"Minority" is defined here as Black, Hispanic, Asian American, American Indian or Alaskan Native populations. Low-income is defined here as a household income at or below the Department of Health and Human Services poverty guidelines (Federal Highway Administration (FHWA), December 1998). A minority population or a low-income population is any readily identifiable group of minority or low-income persons who live in geographic proximity, and, if circumstances warrant, geographically dispersed/transient persons who would be similarly affected by a proposed transportation improvement.

3.3.2 Concentrations of Minority and Low Income Populations

Census tract and block group data from the 2000 US Census were used to identify any concentrations of minority and low-income populations. The 2000 Census contains the most current information available at the block group level of detail. Table 3-12 shows the distribution of non-white and low-income populations at the block group level for the project area, as well as for the town of Blowing Rock and Caldwell and Watauga Counties. In some instances, the block group areas are larger than the project area, but all block groups that are either adjacent to or traversed by any of the project alternatives were included.

The data illustrated in Table 3-12 indicate that minority residents and low-income residents are not disproportionately represented in the project area. None of the four block groups in the project area has more than a 2.5 percent non-white population. The percent of Hispanics in the four block groups in the project area is similar. Block group 2 (of census tract 980800) (with 22 non-white minority persons and three Hispanic persons in 2000) has US 321 north of the US 321 Business intersection as its eastern border, an area of mostly commercial development. Thus, it is unlikely

Table 3-12. Minority and Low-Income Populations, 2000

Area	Population	Non-White	Hispanic	Below Poverty Line
Census Tract 9808 (Watauga County)				
Block Group 1	1,434	36 (2.5%)	21 (1.5%)	110 (7.7%[1])
2	1,005	22 (2.2%)	3 (0.3%)	116 (11.5%[1])
Census Tract 0310 (Caldwell County)				
Block Group 1	1,391	28 (2.0%)	4 (0.3%)	61 (4.4%[1])
2	1,331	32 (2.4%)	11 (0.8%)	196 (14.7%[1])
Blowing Rock	1,418	29 (2.0%)	9 (0.6%)	123 (8.7%[1])
Watauga County	42,695	1,514 (3.5%)	622 (1.5%)	6,761 (15.8%[1])
Caldwell County	77,415	6,398 (8.3%)	1,927 (2.5%)	8,161 (10.5%[1])

[1] Percent based on population for whom poverty status is determined

Note: Percentages represent share of total population

Source: US Bureau of the Census

that this small population would be in the area of affect of any of the project alternatives. The Town of Blowing Rock has a two percent non-white population, less than the non-white populations of Watauga (3.5 percent) and Caldwell (8.3 percent) counties. The Town has a less than one percent Hispanic population (0.6 percent), less than the Hispanic populations of Watauga (1.5 percent) and Caldwell (2.5 percent) counties.

In terms of low-income residents in the four block groups, the highest percentage in any single block group is 14.7 percent in Caldwell County. This also is a larger percentage than the county as a whole. This block group covers a large rural area and has US 321 south of its intersection with US 321 Business as its eastern border. Watauga County Block group 2 (of census tract 031000) has a low-income population of 11.5 percent, also higher than the county as a whole. Field observations of the housing along US 321 in these areas found that it is unlikely that a concentration of low-income persons exists in the portion of the block groups that could be affected by the proposed project. The other two block groups have comparable or lower percents of low-income residents to those of Blowing Rock and Caldwell and Watauga counties as a whole. Therefore, it is unlikely that concentrations of low-income households exist in the rest of the project area.

3.4 Visual and Aesthetic Quality

This description of visual and aesthetic quality in the project area was developed using the procedures found in "*Visual Impact Assessment for Highway Projects*" (US Department of Transportation (USDOT), 1983) and "*Visual Impact Discussion*" (Federal Highway Administration, undated). The first document uses three criteria to judge visual quality: vividness, intactness and unity. The presence of one of the criteria does not connote visual quality. Rather, "all three must be high to indicate high quality" (USDOT, 1983). These procedures are commonly used in the assessment of the visual impacts of proposed highway projects.

Vividness is described as "the visual power or memorability of landscape components as they combine in striking and distinctive visual patterns;" intactness as "the visual integrity of the natural and man-built landscape and its freedom from encroaching elements," and unity as "the visual harmony of the landscape considered as a whole" (USDOT, 1983). The "Visual Impact Discussion" suggests that the visual environment of a project can be defined as identifiable geographic areas referred to as landscape units and their associated viewers. Following this guidance, the existing landscape of each unit in the US 321 project area is described in this section using three factors: existing visual character, visual quality and visually sensitive resources. The visual character of the particular geographic area is discussed in terms of landform, water, vegetation and manmade development found within the area. Visual quality is discussed in terms of the vividness, intactness and unity of the landscape elements in a particular area. Visual quality of the existing area is considered high when "its landscape components (landform, water, vegetation, manmade development) have striking characteristics that convey visual excellence". Visually sensitive resources are noted that may be important for historic, scientific or recreational reasons. Material prepared by the National Park Service defining scenic resources along the Blue Ridge Parkway that could be affected by project alternatives also is presented (National Park Service, August 21, 2000).

Along the existing road, two kinds of viewers are identified: those who have a view from the road and those who have a view of the road. Away from the existing road, the viewers of the area into which a bypass alternative is proposed also are described.

3.4.1 General Characteristics of the Existing Landscape and its Viewers

Landform

Tall ridges and deep valleys dominate the topography or landform in the project area outside the Town of Blowing Rock. Within Blowing Rock one finds a rolling terrain. Roads are also in evidence from the beginning to the end of the project area and typically follow the natural features of the landscape. Rock faces are visible along existing US 321, both as remnants of previous road building and as features in the landscape. Vegetation also is a prevalent landform and influences the visual quality of the area.

Water

Blowing Rock is at the divide of three major watersheds: the New River, the Catawba River, and the Yadkin River. There are, however, no major lakes or streams except for a reservoir near the intersection of US 321 and US 221. Thus, water is not a substantial component of the area's landscape.

Vegetation

The vegetation in the project area consists of deciduous, coniferous, and broadleaf evergreen trees and understory shrubs. The deciduous trees lose their leaves in the fall and remain defoliated until late spring because of the high elevation. Broadleaf evergreen and deciduous shrubs form a dense understory layer of vegetation and often impede views at eye level year round. There is a great difference between the winter landscape and the summer landscape. In the winter, the mountains are more evident, while they are less visible in summer.

Manmade Development

Manmade development in the area varies from sparse rural development south of Blowing Rock and north of the Blue Ridge Parkway, to residential and open space areas in most of Blowing Rock, to commercial uses along US 321 between US 321 Business and the northern Blowing

Rock town limits. The existing US 321 corridor passes through a National Register historic district that includes residences, several inns and a golf course associated with a country club. The Blue Ridge Parkway is an important man-made recreational feature.

Viewers

The viewers of the affected area consist of those who view the road and its environs while traveling along it and those who view the road from a fixed point, such as a residence or business. Typical viewer groups in the project area include: year round and seasonal residents in Blowing Rock and rural areas, visitors and tourists traveling through the area or visiting Blowing Rock and work-related and commercial travelers on US 321.

3.4.2 Description of Landscape Units

The existing US 321 corridor is separated into seven landscape units shown in general in Figure 3-3. Areas not examined within the project area are those that would be unaffected by the project alternatives. An aerial photograph (Figure 3-4, Photograph 1) illustrates the visual characteristics of much of the project area.

Landscape Unit One

This area extends along all alternatives from Blackberry Road at the south end of the project area to the beginning of the Green Park Historic District (shown on Figure 3-6 in Section 3.7.1) near Blowing Rock's Town Limits

Visual Character. The landscape south of Blowing Rock (see Figure 3-4, Photograph 2) is rural in nature, and the road twists and turns through the mountainous area. A ridge on the left as one drives northbound and a valley on the right characterize it. Dense trees cover the area, which obscures most views of the valley. A church, a few homes or clusters of homes, a former motel, and a condominium apartment building (Blackberry Condominiums) are along the road (see Figure 3-4, Photograph 3). The Pisgah National Forest lies west of the project area in Caldwell County. However, private property and a ridge lie between the road and the forest so the forest cannot be seen in this area.

Visual Quality. The landscape components of the areas on both sides of the roadway create scenes of visual excellence. The combination of interesting forms, varied textures, strong lines and contrasting colors conveys a complex composition that is pleasing to the eye. The relationship of the characteristics of vividness, intactness and unity is high as the landscape is a combination of striking natural forms, subdued man-made elements and a lack of intrusive elements that do not contribute to the overall composition.

Visually Sensitive Resources. This portion of US 321 affords brief scenic views of the Blue Ridge Mountains, Blackberry Valley, rural churches, and small hamlets as well as views of other distant vegetation and landforms. The interaction between landforms that are by turn close to and far away from the road and deciduous and coniferous vegetation creates varied views of the surrounding area from the road (see Figure 3-4, Photograph 4). The wooded ridge from design station 633+00 to 647+00 (a distance of approximately 1,400 feet) across from the former Valley View Motel is within the Green Park Historic District.

Viewers. Groups who have a view from US 321 include residents who live or work in Caldwell and/or Watauga County and use the highway for local commuting, as well as tourists traveling to Blowing Rock, the Blue Ridge Parkway, and other destinations. Their views are mostly limited

Figure 3-3. Landscape Units in the Project Area

Figure 3-4. Visual Features of the Project Area

(Part A)

Photograph 1. Aerial View of Most of the Project Area

Photograph 2. Landscape South of Blowing Rock at Blackberry Road

Photograph 3. Looking North Along US 321 Towards the Blackberry Condominiums

Photograph 4. Looking South Along US 321 from Rock Road

Photograph 5. US 321 Viewed from the Gideon Ridge Inn

Figure 3-4. Visual Features of the Project Area
(Part B)

Photograph 6. Looking North from Green Hill Road at the Green Park Inn and US 321

Photograph 7. Blowing Rock Country Club Golf Course from US 321

Photograph 8. Green Park Inn

Photograph 9. View from Pinnacle Drive

Photograph 10. Looking North from the Norwood Circle Area

Photograph 11. Looking South from the Country Club Drive Area

Figure 3-4. Visual Features of the Project Area
(Part C)

Photograph 12. Looking South at Pinnacle Avenue and a Restaurant

Photograph 13. Looking North at US 321/US 321 Business Intersection

Photograph 14. Looking North Between Church Street and Sunset Drive

Photograph 15. Landscaping at the Brookside Inn

Photograph 16. Residence in the Green Hill Area

Photograph 17. Wonderland Drive Area

Figure 3-4. Visual Features of the Project Area
(Part D)

Photograph 18. Goforth Road/Blowing Rock Assembly Grounds Area

Photograph 19. Possum Hollow Road Area

Photograph 20. Looking Northeast Along the Blue Ridge Parkway from Thunder Hill Overlook

Photograph 21. Looking Southeast Towards Blowing Rock from Thunder Hill Overlook

Photograph 22. Looking East from Green Hill Circle on Green Hill

Photograph 23. Looking North from the Blue Ridge Parkway

to areas immediately adjacent to the road by terrain and tree cover. There are two locations where one can pull off the road, but these locations are not developed. They are essentially flat spots next to the road where US 321 once was prior to curve improvements. Limited views can be seen through the tree cover. Guests at the former Valley View Motel and the Blackberry Valley Condominiums have broad views of Blackberry Valley and other parts of the rural countryside east of US 321. Groups who have a view of the road are primarily those who live in the area. These viewers include those with homes along the road and with homes on Gideon Ridge overlooking US 321, as well as viewers from the Gideon Ridge Inn (see Figure 3-4, Photograph 5). Limited views of US 321 and its environs occur through the tree cover at the parking lot for *The Blowing Rock* tourist attraction, which is on a ridge above US 321.

Landscape Unit Two

This area is the portion of the project area within the Green Park Historic District (shown on Figure 3-6 in Section 3.7.1).

Visual Character. US 321 enters the Green Park Historic District approximately 700 feet south of the intersection of US 321 and Rock Road/Green Hill Road. The overall visual character of the Green Park Historic District is generally considered to be charming and attractive. Visual components include late 19th to early 20th century homes built in the Victorian/Queen Anne or Craftsman style and the National Register-listed Green Park Inn (see Figure 3-4, Photograph 6), which serves as the visual anchor of the Green Park Historic District. US 321 passes in front of the Green Park Inn. Another component is the Blowing Rock Country Club golf course, which abuts US 321 (see Figure 3-4, Photograph 7). As one drives northward, much of the land on the left and immediately adjacent to the road is undeveloped, including a former golf course hole south of Rock Road, a grassy hillside opposite the Green Park Inn, and a wooded slope opposite the golf course. A partially wooded and partially open hillside (another former golf course hole) is on the right side of the road as one enters the district from the south. Residential landscapes are also a primary component as they form a visual connection between the mountain vegetation and the man-made development of the historic district. The landscape treatment in the district consists of mature evergreen and deciduous trees and shrubs. Rhododendron and laurel are abundant and screen residences from view.

Visual Quality. The characteristics of vividness, intactness and unity are evident in this area. The Green Park Historic District is memorable for the impression of a mixture of well-maintained largely single-family homes and yards and the golf course. The built and non-built environments have been in place for many years and present a harmonious composition.

Visually Sensitive Resources. The local population views the Green Park Historic District as a valuable resource. In addition, the district is listed on the National Register of Historic Places. The Green Park Inn also is listed individually on the National Register.

Viewers. Groups of people who have a view from the road are likely to be the same as the group discussed in the previous section – local commuters or those with regional business, tourists and through traffic. Groups that might have a view of the road are likely to be greater in number because this area is more densely populated. Discrete locations are the porch at the Green Park Inn, where chairs are provided for guests (see Figure 3-4, Photograph 8), and the golf course fairway that parallels US 321. Views occur from individual residences but generally are partially obscured by tree cover. These homes are generally at a higher elevation than US 321 and include homes on Gideon Ridge Road and Pinnacle Avenue on the southwest and homes on Green Hill Road, Tarry Acres Circle, and Goforth Road on the northeast. Condominium apartments on Goforth Road have

views across the golf course to US 321. Drivers and pedestrians on Pinnacle Avenue look down a grass slope to US 321 and the Green Park Inn (see Figure 3-4, Photograph 9).

Landscape Unit Three

This area extends from the north end of the Green Park Historic District to the US 321/Business US 321 Intersection (only along the Preferred Alternative).

Visual Character. This area is characterized by the presence of single-family and multi-family residences (see Figure 3-4, Photograph 10 and Photograph 11), intersections with secondary roads, the Canyon's of the Blue Ridge Restaurant and associated parking lot (see Figure 3-4, Photograph 12), and open space. Residential use is predominant throughout the area directly adjacent to US 321 as well as along nearby streets such as Norwood Circle, Country Club Drive and Fairway Lane. Trees are close to the road through much of this unit. US 321 has a series of five curves as it winds through this area.

Visual Relationship. The characteristics of vividness, intactness and unity are somewhat less apparent in this unit than in the previous one. The presence of several large asphalt parking areas associated with the restaurant and two condominium apartments are incongruous with the adjacent residential uses. However, many of the residences in the area have mature trees and other vegetation in their yards. A variety of stone and wood retaining and privacy walls provide a sense of separation between residences and the road, creating a sense of unity among the different residential styles.

Visually Sensitive Resources. Although this area does not share all of the characteristics that contribute to the importance of the landscape in the previous unit, it is visually sensitive in that it contains many of the visual elements that the residents and visitors of Blowing Rock find valuable. This landscape unit and the previous one are the only two locations in the project area in Blowing Rock that present these characteristics to the general traveling public. A long-distance view of the Pisgah National Forest occurs in the Norwood Circle area.

Viewers. Groups with views from the road include many of the same groups already mentioned – those making trips related to work or other local destinations and seasonal visitors. Groups that have a view of the road are limited to those whose houses or businesses overlook the US 321 corridor. In addition, visitors at *The Blowing Rock* tourist attraction can see this area in the distance, approximately 3,500 feet away.

Landscape Unit Four

This area extends from the US 321/US 321 Business intersection (see Figure 3-4, Photograph 13) to Possum Hollow Road at the northern end of the project area along US 321 in Blowing Rock.

Visual Character. The visual character of US 321 is strongly related to its highway commercial land use (see Figure 3-4, Photograph 14), although much of the east or right side of the road is undeveloped. This portion of the corridor is straight and exhibits little of the charm and appeal of the previously examined curving portions of US 321. Guidelines are in place, however, to ensure new construction is integrated into the landscape via landscape material such as trees and shrubs. Planting requirements for land development can be found in the Town Code for Blowing Rock, in Chapter 16 – Land Use Ordinance, Appendix E – Screening and Trees. The ordinance's Appendix E contains descriptive information such as guidelines to protect existing large trees during and after construction; typical locations for trees in parking lots; common practices in tree planting; and lists of recommended trees and shrubs. The information in the ordinance's Appendix E also is meant to ensure that plant material is provided an environment in which it can

establish itself and thrive. Several businesses have plantings that contribute positively to the visual character of the area. Examples include the Day's Inn front entry treatment, the Brookside Inn (see Figure 3-4, Photograph 15), and the Christian Science Church.

Visual Quality. The characteristics of vividness, intactness and unity are not high in this area. The visual character is not memorable, nor do the elements of form, line, color, and texture combine to create distinctive visual patterns. The area has little intactness because of the lack of integration between natural and built environments, which co-exist uneasily rather than complement each other. The area does not rate high in unity because of the uncoordinated nature of development along the corridor. Overall, the area does not consistently exhibit the architectural and landscape characteristics that are considered to be important contributing elements to the value of Blowing Rock as a resort community.

Visually Sensitive Resources. There were no visually sensitive resources in the area noted, with the exception of man-made landscape elements associated with some of the land uses in this area.

Viewers. Groups with views from the road are likely to include many of the same groups already mentioned, i.e., those making trips related to work or other local destinations, and seasonal tourists taking advantage of the travel-oriented establishments within the corridor. Residents also frequently pass through this area on their way to the businesses along this portion of US 321 and other parts of Blowing Rock, particularly downtown Blowing Rock, which is several blocks to the west. Groups that have a view of the road are limited to those whose houses overlook the corridor (primarily along Skyland Drive on the east and Ransom Drive on the west), motel guests, and business operators and customers.

Landscape Unit Five

This area encompasses the area in the vicinity of portions of Green Hill Road, Wonderland Drive, Goforth Road, and Possum Hollow Road (along Bypass Alternatives 1A and 1B only).

Visual Character. The visual components of this unit combine to create a pleasant visual pattern. The predominant landforms within this large geographic area are the curving roadways, well-maintained single family homes on hillside and valley lots, and lush landscapes that have been encouraged to grow from forest remnants or that have been established by homeowners. In many instances, it appears that trees and shrubs were accommodated during the building process and thus make an effective screening element between the road and the home (see Figure 3-4, Photograph 16). A wooded area near Wonderland Drive is developing with homes.

Visual Quality. The characteristics of vividness, intactness, and unity are evident in this area. While there is a large man-made component consisting of roads and houses, the overall effect is pleasing. Narrow curving roads and attractive single and multi-story homes, many made of indigenous materials, such as stone and wood, are sited to take full advantage of surrounding views.

Visually Sensitive Resources. Visually sensitive resources in the area consist of the established homes and hillside neighborhoods (see Figure 3-4, Photograph 17 to Photograph 19). Another sensitive resource is the Assembly Grounds in the northern part of the project area. Homes overlook the Blowing Rock County Club's golf course at one location in this area. The northern-most corner of the Green Park Historic District is in this general area, encompassing two contributing structures.

Viewers. Viewers in this area are primarily full-time and seasonal residents of the area.

Landscape Unit Six

This area includes views of Blackberry Valley from homes along Green Hill Road and Heather Ridge Lane and from the Blue Ridge Parkway (along Bypass Alternatives 1A, 1B 4A and 4B).

Visual Character. The visual character of the Blue Ridge Parkway (see Figure 3-4, Photograph 20) and all views from ridges into the valleys below are exceptional. The Parkway was originally conceived as a way to join two National Parks – the Shenandoah in Virginia and the Great Smoky Mountains in Tennessee. Its views of the lands are a valued but diminishing scenic resource. Tourists travel some or all of its 469 miles for the beautifully designed Parkway experience it provides. Blue Ridge Parkway officials describe the view from the Thunderhill overlook area, which is oriented towards the south, as:

> A classic Blue Ridge icon shot looking out over 60 miles of the Carolina Piedmont with the immediate valley on 1/2 mile below. It is the **depth**, as you scan ridge after rippling ridge to the distant horizon that generates such high visual interest and **variety**. Only two other locations in Watauga County offer these same qualities, but none as fully and as well presented as at Thunderhill WA-32 (A) [the number assigned by the Parkway to the view].
>
> The overlook sits at the very edge of the Blue Ridge Escarpment with an expansive 180 degree position on that edge. Even with lateral openness, the view is well framed with Green Hill and a minor ridge to the north forming good edges to the composition creating a bowl that the viewer looks directly down into. The valley and ridges appear as a smooth carpet of green and brown with a continuous cover of deciduous hardwood forest that appear magnified by the illusion of nearness created from the elevated viewer position. The escarpment edge creates constant wind making it an ideal location to view weather events and local raptors soaring on the uplifts. Along with a terrific viewer position to see fall color display, Thunderhill received full points for strong ephemeral images. (National Park Service, August 21, 2000) (See Figure 3-4, Photograph 21.)

US 321 can be seen from the overlook between 1.5 to 2 miles away.

This description also characterizes views of the same valley from Green Hill and homes along the Blue Ridge escarpment off Green Hill road and Heather Ridge Lane (see Figure 3-4, Photograph 22).

Visual Quality. The Blue Ridge Parkway, views from the Parkway, and views from homes on Green Hill and lining the Blue Ridge escarpment along Green Hill Road and Heather Ridge Lane rate high in the characteristics of vividness, intactness and unity. The designs of both the Parkway and the landscape surrounding the Parkway are highly memorable, as well as intact. Natural and built elements are designed and addressed in an integrated manner that complements both landscape and the Parkway, and harmonize with the existing landscape.

Parkway officials have assigned the southern view from the Thunderhill overlook area a Scenic Quality Assessment (SQA) score of 15.5 out of a possible 18. This scoring system was applied to all parts of the Parkway as a mechanism for Parkway officials to identify the scenic views most critical to protect (Johnson, et al, 1997). It is the highest rated view in Watauga County (of 55) and only one of seven panoramas overlooking forested ridges and valleys within an 80-mile region. It received 4.5 points of 5 for vividness, 2.5 of 3 for intactness, and 3 of 3 for uniqueness. (National Park Service, August 21, 2000)

Visually Sensitive Resources. As reflected in the descriptions of visual quality and character, this entire unit is visually sensitive.

Viewers. There are three types of viewers in this unit. The first type is Parkway users who stop at the Thunderhill overlook and pause to absorb the scenery. The overlook focuses on the views to the south. Some viewers may choose to walk across the Parkway and either up a small rise or down the road several hundred feet to see the views to the north. This view, however, cannot be seen from the parking lot for the overlook to the south.

The second type is Parkway users driving by who can briefly see the views both north and south of the Parkway in the Thunderhill area. The third type is residents of homes lining the Blue Ridge escarpment.

Landscape Unit Seven

This area (along Bypass Alternatives 4A and 4B) includes the valley and hillsides seen to the north from the Blue Ridge Parkway (see Figure 3-4, Photograph 23) and the area of Aho Road where it approaches and intersects with US 321. Aho Road is a rural highway serving the local community. Landscape Unit Seven encompasses the portion of the project area north of the Blue Ridge Parkway. Parkway officials describe the view to the north in the Thunderhill overlook area as a "panorama view into a broad rural valley with framing hills (mix of agriculture and forest land use)." (National Park Service, August 21, 2000)

Visual Character. This is primarily a sparsely developed rural area with grassy valleys and wooded hillsides. Two families live in this area along Thunder Mountain Road. A stream and a marshy area parallel Aho Road. A mobile home park and a business are at the intersection of US 321 and Aho Road.

Visual Quality. The Parkway view of this unit is assigned a SQA score of 13. It received 4 of 5 points for vividness, 2.5 of 3 for intactness, and 2.5 of 3 for uniqueness. It is also one of the higher rated views along the Parkway in Watauga County. "Only two other locations in Watauga County offer these same qualities, but none as fully and as well presented as at Thunderhill WA-32 (B)."

Visually Sensitive Resources. Visually sensitive resources are those features that make up the rural character of the area. These features are primarily important to those who live within or near the area. This unit is also important to users from the Parkway, as described above.

Viewers. Viewers include residents at the end of Thunder Mountain Road, Aho Road users, and users of the Blue Ridge Parkway.

3.5 Air Quality

Air pollution results from industrial emissions and emissions from internal combustion engines. The construction of a new highway or the improvement of an existing highway can aggravate existing air pollution problems or improve air quality conditions. The primary pollutant emitted from automobiles is carbon monoxide (CO). Automobiles are considered to be the major source of CO in the project area. The State and National Ambient Air Quality Standards (NAAQS) for carbon monoxide are:

- 1-hour - 35 parts per million (ppm) not to be exceeded more than once per year.

- 8-hour - 9 ppm not to be exceeded more than once per year.

Any concentration above 35 ppm that lasts for at least one hour or concentration above 9 ppm that lasts for at least eight hours is considered a violation of the standards.

Automobiles also are sources of hydrocarbons and nitrogen oxides. Hydrocarbons and nitrogen oxides emitted from cars in an urban area are mixed together in the atmosphere where they react with sunlight to form ozone, nitrogen dioxide, and other photochemical oxidants. It is the photochemical oxidants that can be of concern and not the precursor hydrocarbons and nitrogen oxides. The photochemical reactions that form ozone and nitrogen dioxide require several hours to occur. For this reason, the peak levels of ozone generally occur 6 to 12 miles downwind of the source of pollutant emissions. Regions, particularly urban areas, generally are regarded as sources of photochemical oxidants, not individual streets and highways. The best example of this type of air pollution is the smog that forms in Los Angeles, California. Area-wide automotive emissions of hydrocarbons and nitrogen oxides are expected to decrease in the future because of the continued installation and maintenance of pollution control devices on new cars.

Automobiles are not substantial sources of particulate matter and sulfur dioxide. Nationwide, highway sources account for less than seven percent of particulate matter emissions and less than two percent of sulfur dioxide emissions. Particulate matter and sulfur dioxide emissions are predominantly the result of non-highway sources (e.g., industrial, commercial, and agricultural activities).

Automobiles can emit lead as a result of burning gasoline containing tetraethyl lead. Lead levels in the environment from mobile sources have substantially decreased because of the federally mandated switch to lead-free gasoline.

Section 107 of the 1977 Clean Air Act Amendments requires the US Environmental Protection Agency (EPA) to publish a list of all geographic areas in compliance with the NAAQS, as well as those not in attainment of the NAAQS. Watauga and Caldwell Counties are in attainment (in compliance with NAAQS) for all criteria pollutants (carbon monoxide, ozone,. nitrogen dioxide, particulate matter, sulfur dioxide, and lead).

In addition to the criteria pollutants, the EPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners) and stationary sources (e.g., factories or refineries). Mobile Source Air Toxics (MSATs) are a subset of the 188 air toxics defined by the Clean Air Act. The MSATs are compounds emitted from road vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline.

3.6 Noise

3.6.1 Fundamental Concepts of Highway Noise

Environmental noise, intensity, or level is quantified in decibels (dB). The most commonly used measure of noise level is the A-weighted sound level (dBA). Scientists have found that the human ear is more sensitive to midrange frequencies than it is to either low or very high

frequencies. At the same sound level, midrange frequencies, therefore, are heard as louder than low or very high frequencies. This characteristic of the human ear is taken into account in an A-weighted sound level.

An understanding of the following relationships is helpful in providing a subjective impression of changes in the A-weighted sound level:

1. Except in carefully controlled laboratory experiments, an increase of only 1 dB in A-weighted level cannot be perceived.

2. Outside of the laboratory, a 3 dB increase in A-weighted level is considered a just-noticeable difference.

3. A change in A-weighted level of at least 5 dB is required before any significant change in the noise level in a community would be perceived.

4. A 10 dB increase in A-weighted level is heard subjectively as approximately a doubling in loudness, independent of the existing noise level.

The sound level from any roadway fluctuates from moment to moment as time passes. To take this into account, a common descriptor for environmental noise is L_{eq}. L_{eq} is defined as the constant A-weighted sound level that in a given time period contains the same energy as the actual time-varying sound during that period. L_{eq} has been shown to be a particularly stable descriptor for traffic noise assessment. L_{eq} typically is evaluated over a one-hour period. All noise levels determined in this study are one-hour L_{eq}.

3.6.2 Ambient Noise Measurements

Ambient noise measurements were recorded along the project alternatives on January 10 and 11, 2001. The purposes of the measurements are twofold: 1) to document existing noise levels and 2) to compare the measured noise levels with the predicted noise levels to verify that the agreement between the predictions and measurements is within acceptable limits (model calibration). Nine measurement sites were selected to represent typical noise sensitive land uses within the project area. The selected locations had no buffers or barriers between the roadway and receivers. Figure 3-5 illustrates the nine measurement sites. Table 3-13 lists the locations where measurements were made and the measured levels.

All measurements were conducted according to procedures described in *Measurement of Highway-Related Noise* (Report No. FHWA-PD-96-046, May 1996). These procedures are followed when conducting highway noise measures for all NCDOT projects. Noise levels were measured with a calibrated Quest 2900 Sound Level Meter with microphone and windshield. The microphone was mounted at an approximate height of 5 feet above ground level, which is equal to the average height of the human ear. All measurements were performed under acceptable climatic and street surface conditions.

3.6.3 Noise Prediction Model Validation

Where possible, counts of vehicles by classification were recorded concurrent with the noise measurements. Notations were made of unusual noise events (sirens, pedestrian noises, barking dogs, aircraft, trains, etc.). Ambient noise measurement results presented in Table 3-13 were

Figure 3-5. Noise Sensitive Areas

(Part A)

Figure 3-5. Noise Sensitive Areas

(Part B)

Table 3-13. Measured Ambient Noise Levels (dBA)

Location	Representative Land Use	Date	Measured L_{eq} (dBA)	Predicted L_{eq} (dBA)
US 321 approx. 1,350 feet north of Blackberry Road	Residential	1/11/01	67.5	65.4
US 321 approx. 1,400 feet south of Green Hill Road	Residential	1/11/01	63.4	64.7
Southwest corner of US 321 and the Green Hill Road intersection	Residential	1/11/01	66.7	66.1
Blowing Rock Stage Company parking lot (US 321/US 321 Business intersection)	Residential	1/11/01	64.1	63.9
US 321 approx. 1,000 feet north of Ransom Street	Residential	1/11/01	65.2	62.4
Grandfather View Road approx. 200 feet east of Blowing Rock Water Tank (vicinity of Bypass Alt. 1A/1B)	Residential	1/11/01	37.1	ambient measurement only[1]
United Church of Christ entrance (vicinity of Bypass Alt. 1A/1B)	Residential	1/11/01	53.4	ambient measurement only
Cone Orchard Road approx. 1,300 feet east of US 321 edge of pavement (vicinity of Bypass Alt. 4A/4B)	Residential	1/10/01	35.8	ambient measurement only
SR 1533 approx. 750 feet east of US 321 edge of pavement (vicinity of Bypass Alt 4A/4B)	Residential	1/10/01	60.2	ambient measurement only

[1] Traffic in these rural areas is not great enough for the Federal Highway Administration's Traffic Noise Model to apply and create a predicted L_{eq}. The measured level is used in Chapter 4's noise impact assessment to contrast noise levels with and without the Build Alternatives. The FHWA's Traffic Noise Model is used for predicting noise levels on all NCDOT projects.

compared with the levels predicted by the Federal Highway Administration's (FHWA) Traffic Noise Model (TNM) version 1.1, computerized highway noise prediction model. The FHWA's Traffic Noise Model is used for predicting noise levels on all NCDOT projects.

The noise level prediction model is approved for use if measured and predicted noise levels are within the accepted tolerance standard of ±3 dBA. As shown in Table 3-13, the ability of the TNM to predict accurately noise levels for this project was confirmed as the levels are within the tolerance standard.

3.6.4 Predicted Existing Noise Levels

A noise sensitive site is any property (owner occupied, rented, or leased) where frequent exterior human use occurs and where a lowered noise level would be of benefit. These sites are referred to as receivers. Where more than one site is clustered together, a single receiver may be considered as representative of the group. Noise levels are assessed for exterior areas where frequent human activity occurs.

The receivers along the corridors were organized into 23 noise sensitive areas (NSA, depicted in Figure 3-5). At 15 of those noise sensitive areas, motor vehicle traffic is the dominant noise source. Thus, existing peak hour traffic noise levels were predicted using TNM version 1.1,

highway noise prediction model. Input parameters necessary to run TNM include traffic volumes and speeds, vehicle types, noise sensitive site (or receiver) location and height, roadway geometry, type of intervening ground surface (hard site versus soft site), variations in terrain between the noise source and receiver, and the presence of any building rows, barriers, and/or buffers.

In the 15 noise sensitive areas where traffic is the dominant noise source, there are 182 receivers adjacent to US 321. The results of noise modeling for the 182 receivers indicates that the predicted noise levels for the existing condition are similar in most noise sensitive areas and could be represented by 28 representative receivers. Predicted noise levels under the existing conditions at the 15 noise sensitive areas are presented in Table 3-14.

At the remaining eight of the total 23 noise sensitive areas, traffic is infrequent. All of these areas are greater than 500 feet from US 321, but may be affected by a proposed project alternative. These eight areas contain an additional 103 noise sensitive sites, which are grouped under 18 representative receivers. Where existing US 321 traffic affects noise levels in these area, existing noise levels were predicted with the TNM. In areas where existing US 321 traffic has no affect on existing noise levels, nearby measured levels represent the existing conditions. These are shown in Table 3-14.

3.7 Historic and Archaeological Resources

This project is subject to Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. § 470f), and implemented by the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106, codified as Title 36 of the *Code of Federal Regulations*, Part 800. Section 106 requires federal agencies to take into account the effects of their undertakings (federally-funded, licensed, or permitted) on properties included in or eligible for inclusion in the National Register of Historic Places and to afford the Advisory Council a reasonable opportunity to comment on such undertakings. Section 106 regulations are procedural rather than substantive. The regulations do not ordain preservation but are grounded in consultation among stakeholders to resolve conflicts. Section 106 regulations apply to this project for adverse impacts to the Green Park Historic District because water resources under the jurisdiction of the US Army Corps of Engineers (USACE) within the district are also affected. A dredge and fill permit from the USACE will be required for the effects to jurisdictional water resources under the requirements of Section 404 of the Clean Water Act.

3.7.1 Historic Resources

An architectural survey was conducted in 1997 (Mattson, Alexander & Associates, May 1997) in order to identify historic architectural resources within an area of potential effects (APE). The survey identified an APE that included areas that may face increased development pressures because of the highway construction as well as those areas that may be directly affected by the proposed undertaking. The APE included an area beginning 100 feet west of existing US 321 and continuing east into Blackberry Valley and north across the Blue Ridge Parkway to Aho Road. It also encompassed the entire Green Park Historic District.

The methodology for the survey consisted of background research into the historical and architectural development of the area and a field survey of the APE. All structures 50 years of

Table 3-14. Existing Condition Noise Levels at Receptors Adjacent to US 321

Noise Sensitive Areas	Representative Receiver No.	Number of Receivers	L_{eq}(h) (dBA)
1	2	4	65.7
2	3	3	58.6
3	6	2	54.7
	11	5	47.4
4	12	4	54.0
	16	5	42.0
5	18	2	56.2
	19	2	54.2
6	23	2	63.8
	25	16	54.2
7	32	7	51.4
	38	13	61.4
	39	3	67.6
8	44	5	68.0
	50	9	60.5
9	56	16	61.4
	57	2	63.9
10	70	7	63.8
	74	21	60.9
11	89	14	60.9
12	93	3	60.9
13	97	9	61.7
	99	11	59.5
	108	4	63.5
14	113	1	62.5
	114	5	54.9
15	117	2	52.1
	120	5	51.5
Total:	**28**	**182**	
16	129	7	47.6
	130	6	47.3
17	136	2	46.1
	139	4	44.7
18	141	2	44.7
	143	1	43.2
	145	10	42.5
19	155	9	43.3
	159	3	39.9
	192	1	37.1
20	163	10	37.1
	167	5	35.2
21	177	5	40.8
	179	2	39.8
	185	5	41.5
	188	6	45.8
22	195	3	35.8
23	197	22	60.2
Total:	**18**	**103**	

age and older were photographed, mapped, and surveyed and evaluated for National Register eligibility. A total of 29 resources that appeared to have been built prior to 1946 were identified and evaluated.

The survey found three resources that are listed in the National Register plus one eligible for listing. They are:

1. Green Park Historic District;
2. Green Park Inn;
3. Bollinger-Hartley House; and
4. Blue Ridge Parkway (eligible for listing)

Their locations are shown in Figure 3-6

Green Park Historic District

The Green Park Historic District is in the southern section of the Town of Blowing Rock, on the top of the Blue Ridge escarpment, at an elevation of about 3,640 feet above sea level. It is in both Caldwell and Watauga counties and is approximately 177 acres in size. The Green Park Historic District was developed between 1891 and 1944. It is a residential resort community that contains the Green Park Inn, the Blowing Rock Country Club golf course, and Mt. Bethel Reform Church and Cemetery. Of the 97 resources in the district, 51 are contributing, including 46 buildings, three sites, and two structures. One building that is adjacent to US 321 was contributing but has collapsed and thus is no longer a contributing building. The district is listed under National Register criteria A (associated with events that have made a significant contribution to the broad patterns of our history) and C (distinctive architectural design). The field surveys for this project identified a National Register-eligible extension of the district at its northern end.

The Green Park Inn, the state's second oldest surviving resort hotel, was built in 1891 and is on the east side of US 321 in Blowing Rock. Existing US 321 passes through the Green Park Historic District and in front of the Green Park Inn. The Green Park Inn forms both an historical and architectural anchor for the Green Park Historic District and for the Town of Blowing Rock. Architectural and landscape elements similar to those found within the district are evident elsewhere in the town. The overall direction of the Blowing Rock Comprehensive Plan (2004) is the preservation of the resort village character of Blowing Rock, a character that was developed in large measure because of the contributing structures and landscaping of the Green Park Historic District.

Boundary and Contributing Features. The boundaries of the district are defined by four contributing groups of property, as shown on Figure 3-7:

1. The existing National Register Historic Property boundaries of the Green Park Inn nomination (1982).

2. The Blowing Rock Country Club Golf Course (excluding contemporary expansions).

3. The Leak and Wall Tract Subdivision.

4. The "Stevens and Thompson Group," consisting of "*The Blowing Rock,"* the associated Blowing Rock Gift Shop, and adjacent contributing structures, that was surveyed by Elizabeth Stevens and Deborah Thompson in 1988 and 1989. Many of the structures are on properties developed by C.V. Henkel and the Craig family in the early twentieth century.

Figure 3-6. Historic Resources and Park and Recreation Areas

Figure 3-7. Green Park Historic District

Table 3-15 identifies the properties contributing to the district, dates of construction, and the attributes that make them eligible for the National Register. This information was taken from the National Register nomination (National Park Service, August, 1994) and a 1997 survey conducted as a part of preparation of the DEIS. The 1997 survey identified a National Register-eligible extension to the district (Mattson, Alexander & Associates, May 1997). Table 3-15 also describes the properties' relationship to US 321 in terms of distance and vegetative cover. The locations of contributing properties near US 321 are shown in Figure 3-8.

Use and Ownership. Most of the contributing properties in the district are residential, privately owned, and used as second or vacation homes. In some instances, these properties are occupied by year-round residents. The four non-residential contributing properties are the Green Park Inn, Gideon Ridge Inn, "*The Blowing Rock*" attraction and the associated Blowing Rock Gift Shop, and Blowing Rock County Club golf course, all of which are privately owned.

Architectural and Landscape Features. The Queen Anne-style Green Park Inn was an integral feature in the development of this mountain-top area for resort estates and cottages in the late nineteenth and early twentieth centuries. The golf course, constructed shortly after 1915, increased the recreational opportunities of the area, which in turn supported the continued success of the hotel and the marketability of residential properties in the Green Park area. The residential neighborhoods are contributing elements to the district because of:

1. Variations on vernacular architectural designs that have in common many design and decorative features.

2. Construction for similar purposes (i.e., as a resort house), and during a specific period (i.e., 1920 to 1930).

3. A common social focus on the Green Park Inn and the golf course/country club.

The three elements – hotel, golf course, and neighborhoods – are spatially contiguous and related historically. In addition, the landscaping of the area has been relatively stable for the last three-quarters of a century, creating an environment of mature trees, rhododendron and laurel thickets and well-kept lawns.

To date, there has been little intrusive development to interrupt the visual character of the area. While several structures post-dating the formative context of the district have been built within the district, these additional structures are of styles and materials making them compatible and consistent with the contributing structures. A new set of condominiums was built behind and to the north of the Green Park Inn in 2001. In 2000, a developer proposed the construction of condominiums on the opposite side of US 321 from the golf course, which would displace one contributing structures. The condominiums have not been built.

Common architectural styles of the late nineteenth and early twentieth century exhibited by contributing structures include the late Victorian (Queen Anne), Tudor Revival, American Foursquare, and Craftsman styles. Some contributing structures have original chestnut bark siding, a type of exterior siding characteristic to the area. Another common architectural component is the use of stone for exteriors, chimneys and fireplaces, foundations, and walls.

Table 3-15. Characteristics of District and Contributing Properties

Number[1]	Property Name	Type of Property	Year Built	Attributes That Make Property Eligible		Distance from Structure to Existing US 321 ROW [2]	Distance from Structure to Existing US 321 Pavement [2]	Existing Width of Vegetation Cover Between Structure and US 321 [2]	Visibility of US 321 from Resource	Other Resource Features
				Historic	Architectural					
	Green Park Historic District	District	1891-1944	Construction for a similar purpose and during a specific period; common social focus on Inn and golf course	Variations on vernacular architectural designs with compatible styles, materials and features	US 321 passes through the district	US 321 passes through the district	Varies	Portions are visible.	Informal and densely wooded landscaping; stone walls along west side of US 321
	District Contributing Properties:									
1	The Blowing Rock and Reception Center/Gift Shop	Commercial	1935	Association with "The Blowing Rock" attraction and the development of tourism in the area	Stone building with high hipped, wood shingled roof, reminiscent of Tudor Revival style	600 [SE]	610 [SE]	550 [SE]	Mostly obscured to the southeast, though woodlands visible to the north across the gorge (about 2,600 ft)	"The Blowing Rock"; stone walls line driveway, parking lot, and building
2	Charles H. Turner Cottage and associated servants cottage	Residential	c. 1923	None	Typical vernacular style bungalow with wood shingle siding, fieldstone foundation, and low stone walls	480 [SE] 445 [N]	515 [SE] 460 [N]	390 [SE] 20 [N]	Mostly obscured by woodlands to southeast; view to north toward Inn partially shielded	View of the Inn and the golf course
3	Jack Dunavant Cottage	Residential	c. 1920s	None	Typical vernacular style bungalow with stone retaining walls at rear	450 [SE] 455 [N]	490 [SE] 465 [N]	360[SE] 20 [N]	Mostly obscured by woodlands to southeast; view to north toward Inn shielded partially by tree cover at road	View of the Inn and the golf course
5	Much More	Residential	c. 1923	None	Well-maintained example of classic bark-shingled bungalow with Craftsman influence	420 [SE] 445 [N]	460 [SE] 470 [N]	365 [SE] 110 [N]	Mostly obscured by woodlands to southeast; view to north mostly obscured by trees on the golf course	View of the Inn and the golf course

Table 3-15. Characteristics of District and Contributing Properties

Number[1]	Property Name	Type of Property	Year Built	Attributes That Make Property Eligible		Distance from Structure to Existing US 321 ROW [2]	Distance from Structure to Existing US 321 Pavement [2]	Existing Width of Vegetation Cover Between Structure and US 321 [2]	Visibility of US 321 from Resource	Other Resource Features
				Historic	Architectural					
6	Little More	Residential	c. 1923	None	Bark-shingled Craftsman style cottage; a unique example of architecture adapted to the landscape (each of the 6 rooms has its own level); connected to Much More Cottage by typical stone wall	415 [SE] 435 [N]	455 [SE] 450 [N]	375 [SE] 90 [N]	Mostly obscured by woodlands to southeast; view to north mostly obscured by tree cover on the golf course	View of the Inn and golf course
7	McDonald Family Cottage and garage	Residential	c. 1922	None	Bark siding-clad cottage; bark-clad garage	455 [SE] 425 [N]	495 [SE] 440 [N]	370 [SE] 90 [N]	Mostly obscured by woodlands to southeast; view to north obscured by foliage and structures	Dense foliage around house
8	Harper-Shuford-Wise Cottage	Residential	1923	None	Vernacular style rustic house with fieldstone foundations and use of peeled tree trunks as supports	390	395	190	Mostly obscured by woods to north	Dense foliage on property
9	Gideon's Ridge Inn	Hotel	1940-1942	None	Reminiscent of Tudor Revival style; exterior stone siding quarried at Grandfather Mountain; built by local stonemason who built Duke Chapel; typical low stone walls	190	230	180	Mostly obscured by woods down steep hillside to road	Dense foliage; stone walls
10	Shuford Family Cottage and garage	Residential	1925-1927	None	Two-story dwelling sheathed in bark; rustic front porch with skinned pole supports; steep gable roof, stone chimneys, and stone foundation	110	120	80	Partially obscured by trees with 35 ft. break in cover at road	Dense foliage around house
11	Clement-Slane Cottage and garage/servant's room	Residential	1923	None	Vernacular style cottage with bark siding	450	355	100	Mostly obscured by trees on parcel	Dense foliage on property

Table 3-15. Characteristics of District and Contributing Properties

Number[1]	Property Name	Type of Property	Year Built	Attributes That Make Property Eligible		Distance from Structure to Existing US 321 ROW [2]	Distance from Structure to Existing US 321 Pavement [2]	Existing Width of Vegetation Cover Between Structure and US 321 [2]	Visibility of US 321 from Resource	Other Resource Features
				Historic	Architectural					
12	Faraway and garage and other contributing structures	Residential	1920s	None	Two-story Foursquare cottage with characteristic chestnut bark shingle siding	630	645	210	View totally obscured by trees on parcel and adjacent properties	Stone walls; adjacent to "The Blowing Rock" property; spectacular view of the gorge
13	Knox Family Cottage and shed	Residential	c. 1910	None	Two-story vernacular style cottage	345	350	50	Partially shielded by trees near road	Dense foliage on property
14	Cannon Family Cottage	Residential	1915	Association with historical person	Vaguely Dutch Colonial style with Craftsman type windows	320	330	50	Partially shielded by trees near road	Rock wall in front of house; a gazebo observatory on the edge of the gorge at the rear of the house
15	Henkel Family Cottage	Residential	c. 1914-1915	Association with person of local significance	Vernacular architectural design, covered with wood shingles – a favorite building material in Blowing Rock	345	350	0	Clearly visible	Dense foliage around house; stone walls at rear
17	McDowell Cottage	Residential	c. 1890	Association with historic person	Outstanding architecture; two-story Queen Anne frame dwelling with additions and remodeling	380	385	210	View mostly obscured by trees on property and surrounding properties	Dense foliage around house; stone wall at rear
18	Robert A. Dunn Cottage	Residential	1924	None	Craftsman-style house with stone from Grandfather Mountain	550	555	400	View totally obscured by trees on property and surrounding properties	Dense foliage around house
20	Green Park Inn (National Register listed)	Hotel	1891/ 1914	Importance to the early development of the tourist industry in Western NC	Well-maintained example of "grand frame resort architecture" of the late Victorian era	55	65 (35 feet to driveway canopy)	0	Clearly visible.	Porch sitting is an Inn amenity
21	Cottage	Residential	c. 1930	None	One-and-a-half story frame bungalow with wide weatherboard siding	65	70	0	Clearly visible	

Table 3-15. Characteristics of District and Contributing Properties

Number[1]	Property Name	Type of Property	Year Built	Attributes That Make Property Eligible		Distance from Structure to Existing US 321 ROW [2]	Distance from Structure to Existing US 321 Pavement [2]	Existing Width of Vegetation Cover Between Structure and US 321 [2]	Visibility of US 321 from Resource	Other Resource Features
				Historic	Architectural					
22	Coxe Cottage	Residential	c. 1925	None	Typical rustic Craftsman cottage design (the building has collapsed since the survey was conducted; it is no longer contributing)	30	35	0	Visible – 40 ft wide break in foliage	Stone walls; dense foliage on south
23	A.G. Jonas Cottage	Residential	1920s	None	American Foursquare style; chestnut bark shingle siding characteristic of the district; porch railing similar to that of the Green Park Inn	75	80	65	Mostly obscured by trees around the structure	Dense foliage around house
24	Cottage and garage	Residential	1920s	None	Craftsman style with roughly-hewn, scalloped-cut, weatherboard siding typical of other houses in Blowing Rock	90	100	50	Mostly obscured by trees between house and road	Dense foliage between house and road; stone walls
26	Craig Family Cottage and garage/servant's room	Residential	c. 1920	None	Craftsman style influence with wood shingle siding; interior chestnut	290	300	100	Mostly obscured by trees and shrubs around structure and tree cover near roadway	Dense foliage between house and road; stone walls
29	Green Family Cottage	Residential	1920s	None	Two-story cross-plan frame dwelling with bark siding; located behind the Green Park Inn	335	350	190	View totally obscured by trees on parcel and surrounding parcels	Dense foliage around house
33	Charles Calvert Smoot, III Cottage and garage	Residential	c. 1935	None	Variant of Tudor Revival style; stone veneer and typical stone wall	600	620	530	View totally obscured by trees on parcel and surrounding parcels	Dense foliage around house; stone walls
34	Helen Potts Armstrong Cottage	Residential	c. 1935	None	Two-story frame dwelling with a low hip roof and stone foundation; interior and exterior stone chimneys	770	810	600	View totally obscured by trees on parcel and surrounding parcels	Dense foliage around house

Table 3-15. Characteristics of District and Contributing Properties

Number[1]	Property Name	Type of Property	Year Built	Attributes That Make Property Eligible		Distance from Structure to Existing US 321 ROW [2]	Distance from Structure to Existing US 321 Pavement [2]	Existing Width of Vegetation Cover Between Structure and US 321 [2]	Visibility of US 321 from Resource	Other Resource Features
				Historic	Architectural					
35	James Ross Cannon Cottage	Residential	c. 1927	Association with persons of regional significance	General Craftsman style with fieldstone and wood shingle siding; stone walls around terrace	795	810	370	View totally obscured by trees on parcel and surrounding parcels	Dense foliage (woods and rhododendron thickets) around house; stone walls
39	Blowing Rock Golf Course (north of Inn)	Recreational	1915-22	Importance to historic development of the Green Park area	Compatible with district landscape features (mature conifers, well kept lawns, rhododendrons and laurels)	35	50	0	Hole west of US 321 partially obscured by tree cover at road; otherwise clearly visible	Private home reduces the chance that errant drives hit traffic on US 321
43[3]	Young-Shaw-Steele House	Residential	c. 1928	None	One-and-a-half story frame dwelling with Craftsman-style elements of design; first and second story porches	This resource is over ¾-mile from US 321 and, thus, has no visibility from US 321. The resource is in closer to the Bypass Alternative 1 corridor.				

Figure 3-8. Relation of Historic District Features to Preferred Alternative

Views. Situated atop the Blue Ridge escarpment, residents and visitors have spectacular views of the surrounding Blue Ridge Mountains. The Green Park Inn and other contributing properties in the historic district are among the first properties viewed by people traveling north on US 321 from points south. Viewers from the road see the park-like setting created by the mature trees and well-established landscaping, homes set back from the road and partially obscured by the landscaping, and the entrance to the Inn adjacent to the roadway. Dense woods tend to obscure the view of the road from most of the contributing structures in the district. Exceptions are views from the front of the Green Park Inn and from several homes on Pinnacle Avenue. Viewers at the Inn, within 65 feet of US 321, have an unobstructed view of the roadway from the front porch.

Traffic and Pedestrian Movement. Vehicular traffic in the Green Park Historic District is carried on US 321 and on local streets. Approximately 30 gravel parking spaces used by Green Park Inn patrons are across from the Inn on the west side of US 321; people using these spaces must cross US 321 on foot to reach the Inn. This parking is not owned at this time by the Green Park Inn, although it was at one time. The current owner of the land allows the Inn to continue to use the spaces.

Noise. An existing peak hour noise level of 61.4 dBA (L_{eq}) was modeled at the Green Park Inn (see Section 3.6, receptor 38 on Table 3-14).

Green Park Inn

The Green Park Inn was listed on the National Register of Historic Places (NRHP) on June 3, 1982. Its National Register property boundary is shown in Figure 3-6. Its location is shown on Figure 3-7 The original portion of the structure was built in 1882. The property borders the right-of-way of existing US 321. The main entrance of the Inn is approximately 65 feet from the road, although the edge of the driveway canopy is within 32 feet of the roadway.

Characteristics. The Green Park Inn is considered significant because of its importance in the early development of the tourist industry in western North Carolina. The original 1882 wood frame structure was built in the Queen Anne style of architecture and today it is considered a well-maintained example of "grand frame resort architecture" of the late Victorian era (Swaim and Hutchison, 1981). Twentieth century alterations and additions of frame and brick complement the original style. The foundation of the original structure is wood piles set in concrete or brick footings.

The 1982 Green Park Inn National Register property boundary represents the extent of the Green Park Hotel property as late as 1950. Included in this boundary are three structures contributing to the Green Park Historic District – the Green Family Cottage (#29 in Table 3-15), the Charles Calvert Smoot III Cottage and garage (#33), and the James Ross Cannon Cottage (#35). The forested landscaping in the area is consistent with the aesthetic environment of the Green Park Inn and the adjacent district.

Use and Ownership. The Green Park Inn is privately owned. It has been used as a resort hotel since its construction in 1882. The Inn is also used for dining, catering, and meetings. Outdoor activities for the guests include sitting on the front porch (facing US 321) and swimming in the pool on the north side of the Inn. A patio is available for outdoor sitting on the south side of the hotel; the road is not visible from this patio.

The Inn has sleeping accommodations and dining operations. There are 85 sleeping rooms, 12 meeting rooms, and approximately 450 seats for restaurant service. The Inn caters not only to

tourists for overnight and resort accommodations but also to tourists and residents for dining service and meetings.

Because of the mountain setting, the Inn is not air-conditioned. Windows in the rooms are opened in the spring, summer, and fall seasons to take advantage of mountain breezes.

The peak season for tourist activity is April through October, although the Inn and its restaurants are open year round. The peak season guests are generally traveling to the area to enjoy the cooler weather, the mountain setting, and the tourist attractions. In the winter, the Inn receives guests traveling to the area for the winter sports (skiing) and for Inn and restaurant promotions.

Access, Guest Movements, and Parking. Vehicular access to the Green Park Inn is via US 321 and Green Hill Road. Parking for guests is available on the south side of the Inn (east of US 321) and west of the Inn across US 321. Paved parking spaces for guests are available south of the Inn. Inn patrons may use a gravel parking area west of the highway, although the land is not currently owned by the Green Park Inn. Guests parking on the west side of US 321 must cross US 321 on foot to and from the Inn. Parking spaces for employees are available to the rear of the Inn.

Bollinger-Hartley House

North of the Green Park Historic District, the Bollinger-Hartley House is in Blowing Rock west of US 321 and north of Sunset Drive. It was constructed in 1914 and was listed on the National Register in 1995. The house satisfies Criterion C for listing in the National Register. It is important in the architectural history of Blowing Rock and Watauga County as an intact example of the bungalow style that developed as a popular house design for local residents during the tourist boom of the early 20th century. Although the home does not have direct access to US 321, the boundary of the property is adjacent to the US 321 right-of-way. The home is approximately 25 feet from the US 321 right-of-way and 55 feet (16.8 meters) from the current edge of pavement. The ground upon which the home sites is approximately 12 feet lower than the elevation of US 321.

Blue Ridge Parkway

The Blue Ridge Parkway is a 469-mile scenic highway that extends through 17 counties of western North Carolina (plus 12 counties in Virginia). Construction began in 1935. The Parkway was designed to connect the Shenandoah National Park in Virginia with the Great Smoky Mountains National Park in North Carolina, providing drivers with a variety of mountain views along the route. It is considered one of the crowning achievements of the federal public works projects of the 1930s. To ensure control over key vistas beyond the 100 foot right-of-way, the parkway planners at the National Park Service and the Bureau of Public Roads purchased numerous adjoining parcels and scenic easements and created overlooks and wayside parks. The beautiful rock bridges, built by Italian and Spanish masons, are among the parkway's signature features. Concern for protecting the parkway and its vistas in the face of increasing mountain development has spurred a variety of conservation efforts in recent years. The Parkway runs for 27 miles in Watauga County and has 55 view areas in the county. The Parkway crosses US 321 via an overpass immediately north of Blowing Rock. The Blue Ridge Parkway is described further in Section 3.8.3, "Parks and Recreation Areas."

3.7.2 Archaeological Resources

An archaeological survey was conducted of the alternative project corridors. The APE for this work was defined by the cut and fill limits of the design alternatives and included approximately 375 acres. The purpose of the survey was to determine if archaeological resources that are listed on or potentially eligible for, the National Register of Historic Places (NRHP) are within the alternative corridors. Resource eligibility was assessed against NRHP criteria.

Background research was conducted at the North Carolina Office of State Archaeology (OSA) in Raleigh. This research found that there are no previously recorded archaeological sites in or adjacent to the APE.

The APE was surveyed in the field to identify previously unrecorded archaeological sites. Portions of the APE that could be safely accessed were surveyed. Areas of steep terrain, disturbed areas, and wet areas were not surveyed. Shovel tests were conducted in the areas surveyed. No archaeological sites were found. The surveyors recommended that no additional archaeological work was needed. The State Historic Preservation Officer (SHPO) confirmed in a letter dated June 13, 2001 that no further archaeological studies were needed (see Appendix A).

3.8 Parks and Recreation Areas

There is only one public park in the project area, the Blue Ridge Parkway. Three private recreation opportunities, *The Blowing Rock* (which was described under "Tourism and Retail" in Section 3.1.3), the Blowing Rock Country Club, and a church assembly grounds are in the project area. The locations of these areas are shown in Figure 3-6.

3.8.1 Blowing Rock Assembly Grounds

The Blowing Rock Assembly Grounds, founded in the late 1940s, is a conference and retreat center sponsored by the United Church of Christ. Its entrance is on Goforth Road and the grounds extend north to the Blue Ridge Parkway. Most buildings are congregated in one area and include a lodge, dormitories and a gym. Six two-bedroom cottages are also on the property. Two miles of hiking trails and an open field used for recreation lie between the lodge and the Blue Ridge Parkway. The woods in this area are used for high school retreats with an ecology theme. A spring on the property is the source of the New River. The Assembly Grounds can house approximately 400 guests. Homes lie along Goforth Road opposite the Assembly Grounds.

3.8.2 The Blowing Rock Country Club

A portion of the Blowing Rock Country Club golf course is adjacent to US 321. It is a private club. Motor vehicle access to the Country Club is via Country Club Drive, which intersects with US 321. The fairway for the number 4 hole of the 18-hole course parallels US 321. The green is near Goforth Road and the tee is near Country Club Drive. The fourth hole is considered to be the club's signature hole, with its views of the Green Park Inn and Green Hill. Country club officials have indicated that the several houses that lie between US 321 and a portion of the fairway serve to prevent errant drives from the tee from reaching US 321 and striking passing motor vehicles.

3.8.3 The Blue Ridge Parkway

The Blue Ridge Parkway links the Shenandoah and Great Smoky Mountains National Parks with a 469-mile long "national rural Parkway." It is dedicated to enhancing the outstanding scenic and recreational qualities of the corridor that it traverses, conserving unimpaired its significant natural and cultural resources, and promoting the public enjoyment and appreciation of the Central and Southern Appalachian mountains.

Purpose

"A national Parkway is a federally-owned, elongated park featuring a road designed for pleasure travel and embracing scenic, recreational or historic features of national significance. Access from adjoining properties is limited, and commercial traffic is not permitted. A national Parkway has sufficient merit and character to make it a national attraction and not merely a means of travel from one region to another." (National Park Service, 1964) The purpose of the Blue Ridge Parkway is to:

1. Manage the scenic, natural and cultural resources of the Parkway's designed and natural areas to preserve the integrity of resources and to provide a quality visitor experience;

2. Influence the protection of the scenic, natural and cultural resources within the corridor comprised of those lands that are visible from the Parkway and/or situated adjacent to the boundary; and

3. Conserve and provide for the enjoyment and understanding of the natural resources and cultural heritage of the Central and Southern Appalachian Mountains.

The Blue Ridge Parkway was established on June 30, 1936, as the first rural national Parkway by Congressional Act, Public Law 848 and is administered by the National Park Service. The legislative intent of the Parkway emphasized scenery. In a 1936 letter, Harold L. Ickes, Secretary of the Interior, wrote to the Chairman of the Committee on the Public Lands of the US House of Representatives that certain areas adjacent to the Parkway present "fine possibilities of scenic or recreational development for the benefit of the public." A 1936 House of Representatives report (No. 2544) stressed that the purpose of the Blue Ridge Parkway is to provide a connecting scenic highway and adjacent roadside recreational area between the Shenandoah National Park in Virginia, and the Great Smoky Mountains National Park in North Carolina and Tennessee (Blue Ridge Parkway Position Paper, 2000).

Value

The Blue Ridge Parkway has been considered for a nomination in the category of parkways for National Historic Landmark status. The Parkway would be the first landmark in the Parkway category because no other park in the country better represents the art of Parkway design and construction as practiced in the 1930s (Blue Ridge Parkway Position Paper, 2000).

A National Historic Landmark Theme Study described the Blue Ridge Parkway as being conceived of and constructed as a true Parkway, not a park road; it was planned as a corridor park, not as a road providing access within a larger park. The Theme Study further concludes that as a surviving example of Parkway design of the 1930s, the Blue Ridge Parkway is unparalleled. Elsewhere, modernizations and widenings have all but eliminated the historic landscape designs of other early non-federal parkways. The Blue Ridge Parkway – protected by its Federal ownership and its relatively remote location – is considered to be the most significant

remaining example of pre- and post-war automotive Parkway design with the greatest degree of integrity in the United States (National Park Service, August 2000).

Because of its diverse topography and its numerous vista points, the Parkway provides the most accessible way to visit and experience Southern Appalachian rural landscapes and forested mountains along a 469-mile long protected corridor. The Parkway is a primary catalyst for the promotion of regional travel and tourism by serving as a unifying element for 29 counties in North Carolina and Virginia through which it passes. It is a major contributor to the economic vitality among the different counties. The Blue Ridge Parkway has been determined to be eligible for the National Register of Historic Places.

Development Issues

The Park Service has commented on the issues that influence protection of the Parkway's viewshed and how these issues have changed over time: "At the time of construction, the views beyond the narrow boundary of the Parkway were either idyllic rural farmsteads or views into forests. Today, those 'views to the horizon' are changing. Virginia and North Carolina have become top retirement destinations. This distinction has brought a flurry of residential construction. In addition, restrictions to logging old growth timber in the Northwest have added pressure to cutting stands of timber in the Southeast (National Park Service, 2001)."

The National Park Service has no jurisdiction over land use or appearance, beyond the Parkway right-of-way boundary. Instead, county ordinances are relied upon to protect scenic beauty near the Parkway. Not all counties have established such ordinances. Watauga County, however, has adopted minimal viewshed protection ordinances for the Blue Ridge Parkway (conversation with Larry Hultquist, National Park Service, February 5, 2001).

Notable Features in the Project Area

The Blue Ridge Parkway passes though the US 321 improvements project area. The most notable feature of the Parkway in the project area is the panoramic view to the south of Blackberry Valley in Caldwell County from Thunderhill overlook. Views to the north in this area are also notable. The characteristics of these views are described in detail in Section 3.4.2 of the visual and aesthetic quality discussion under the heading "Landscape Unit Six." Green Hill Road intersects the Parkway in the project area. Here views are of mostly undeveloped farmland. To the west of this point, views of lands surrounding the Parkway are blocked either by terrain or forest.

Effects of Other NCDOT Projects on the Parkway

Table 3-16 lists past, present, and programmed NCDOT projects that affect the Blue Ridge Parkway. The earliest project (widening US 321 from Blowing Rock to Boone) dates to the late 1970s. The other projects were planned or programmed in the 1990s or in 2000. All are road improvement projects, either widening or upgrading existing roads that cross or end at the Parkway. None of the projects involves new crossings of the Parkway. Issues raised regarding impacts on the Parkway primarily related to the appearance of replacement bridges and the loss of vegetation to the improved road and the associated changes in ramps between the improved road and the Parkway. The volume of projects in the last 10 years and planned future projects reflects growth in population, employment, and tourists in the regions surrounding the Parkway and associated growth in traffic. All but one of the projects that involve widening roads are either in the Asheville metropolitan area or in Watauga County on roads leading to Boone. The exception is a proposed widening of US 221. Other projects outside of the Asheville area or Watauga County are upgrades of two-lane roads, such as creating standard width lanes or adding climbing lanes.

Table 3-16. Past, Present, and Programmed NCDOT Projects Affecting the Blue Ridge Parkway

TIP No.	Location	Status	Environmental Documents	Effects on the Blue Ridge Parkway
R-67	US 321, Watauga County	Project built	Final Environmental Impact Statement (1976)	• Widened US 321 between Boone and Blowing Rock, including under the Parkway. • A new bridge was built to carry the Parkway over the widened US 321 and access ramps to US 321 were realigned. • The bridge was not designed to imitate the stone arch bridges elsewhere along the Parkway and is now considered to have had a negative impact on the Parkway, particularly on views of the Parkway from US 321. • The use of a modern bridge structure when widening roads crossing the Parkway was not done again (see the US 421 project noted below) and there is no expectation on the part of either the NCDOT or Parkway officials that this approach will ever be repeated. • At the time, the US Department of Interior (DOI) expressed the concern that potential development from project could affect the aesthetic quality of the Parkway.
R-529B	US 421, Watauga County	Project built	Draft Environmental Impact Statement/Draft Section 4(f) (1992); Environmental Assessment/ Finding of No Significant Impact (1993); Final Environmental Impact Statement/Final Section 4(f) (1994)	• Widening to four or five lanes US 421 from just west of the South Fork New River to SR 1361, including the crossing of the Parkway • Existing stone arch façade bridge removed and four new travel lanes constructed to pass US 421 under the Parkway • Existing bridge replaced with dual stone arch façade bridges • Retaining walls constructed along US 421 between the highway and the Blue Ridge Parkway to reduce impacts to the Parkway • Parkway adversely affected by loss of land for construction and loss of native vegetation
U-2801B	US 25A, Buncombe County	Project built	Environmental Assessment and Finding of No Significant Impact (1994)	• Widening to a five-lane curb and gutter facility. • Crosses the Parkway • No Parkway lands used
R-2100	NC 16, Ashe County	Portion at Parkway (R-2100C) built	Environmental Assessment/Finding of No Significant Impact/Programmatic 4(f) (1995)	• Upgrading of this two-lane road and adding a guard rail • NCDOT developed a planting plan for the area of construction adjacent to and part of the Parkway; notified the Parkway of all trees to be removed; and acquired replacement property to mitigate the acquisition of right-of-way required for the project.

Table 3-16. Past, Present, and Programmed NCDOT Projects Affecting the Blue Ridge Parkway

TIP No.	Location	Status	Environmental Documents	Effects on the Blue Ridge Parkway
R-2306	US 74, Buncombe County	Project built	Environmental Assessment/Finding of No Significant Impact/Programmatic 4(f) (1995)	• Widening US 74 to four lanes under the Parkway • Sufficient right-of-way was designated for widening US 74 at the time of construction of the Parkway, thus no additional right-of-way was required • Four-lane typical section used to avoid impacts to the overpass; the NCDOT agreed to repair any damages to bridge caused by construction
U-2903	NC Arboretum, Asheville	Project built	Environmental Assessment /Finding of No Significant Impact (1996)	• 95 feet of new main entry road crosses Parkway right-of-way, connecting to a Parkway ramp • No significant grading or tree clearing within the Parkway boundary line. Vegetation removal limited primarily to removal of vines and underbrush • Suggested Parkway vegetation used in re-vegetation
U-3403C	NC 191, Asheville	Under construction	Environmental Assessment/Programmatic 4(f) Evaluation (1999) FONSI (2000)	• Widening of NC 191 at its intersection with the Parkway, realignment of a Parkway ramp, and addition of a turn lane to the ramp • Acquisition of approximately 0.28 acre Parkway right-of-way at intersection • Extended culvert under Parkway • Visual impacts minimized using landscaping, special signal heads and poles, signage, and maximized side slopes • SHPO concurred that project will have no effect on the Parkway
R-2595	US 221, Avery County	Unfunded	Preparation of environmental documentation not begun	• NC 194 to NC 181 in Linville. Widen to multi-lanes • Crosses Parkway when paired with R-2596
R-2596	US 221, McDowell County	Portion crossing the Parkway (R-2596C) unfunded	Preparation of environmental documentation not begun	• NC 226 to NC 194. Widen to multi-lanes • Crosses Parkway when paired with R-2595
R-2207A	NC 16, Wilkes County	Project built	Completed	• Updated two-lane and added climbing lanes • Project terminated at the Parkway
R-2598	NC 226, McDowell County	Under construction	State minimum criteria completed	• Update two-lane roadway in existing right-of-way from the Parkway to US 19E
R-3101	US 21, Alleghany County	Planning in progress	Environmental Assessment under preparation	• Roaring Gap to Sparta • Upgrade roadway to 24 feet with 2-foot paved shoulders.
R-2516	NC 18, Alleghany County	Unfunded	Preparation of environmental documentation not begun	• From Parkway south of Citron to Sparta • Upgrade roadway

The replacement bridge built to take the Parkway over the widened US 321 was criticized because it was not designed to imitate the stone arch bridges used elsewhere along the Parkway. It is now considered to have had a negative impact on the Parkway, particularly on views of the Parkway from US 321. The use of a modern bridge structure when widening roads crossing the Parkway has not been requested. (Note the US 421 project – R-529B – described in Table 3-16.)

3.9 Fog

In 1999, 16 accidents in Caldwell and Watauga counties were reported to occur under fog conditions. The fog related to these accidents was probably widespread since there was a close correspondence between fog reports at two western North Carolina airports (Asheville, North Carolina and Tri-City in the Johnson City/Bristol/Kingsport, Tennessee area) and the accidents.

Low-level fog occurs when the air layer nearest to the ground becomes saturated with water vapor such that the vapor condenses into tiny liquid water droplets that are suspended in the air. The suspended water droplets form a cloud that reduces the atmosphere's transparency (visibility) near the ground. Low-level fog can form by several different natural processes, all of which cause fogging by one of the following two methods:

8. Cooling the atmosphere to its dew point (or moisture saturation) temperature, or
9. Evaporating additional moisture into the atmosphere until saturation is reached.

The most likely types of fog in the project area are radiation, advection, and upslope. Radiation fog, also called nocturnal or ground fog, can occur on clear and calm nights when the heat from the surface radiates into the atmosphere. As the heat radiates, the layer of air nearest to the ground cools the fastest, until its dew point temperature is reached. Fogging then begins and increases through the nighttime. Once formed, radiation fog often spreads upward in the atmosphere to depths of over several hundred feet. Radiation fog generally dissipates within several hours after sunrise, as the sun's rays heat up the air layer closest to the surface, thereby lifting and evaporating the surface fog.

Advection fog is formed when warmer, moister air moves into a region replacing colder air that has cooled the surface. As the warm, moist air flows over the cooled surface, fog begins to form at the surface from the contact cooling of the moist air. This type of fog is very common over snow-covered areas and can often become extremely dense under calm wind conditions. This type of fog can persist until the local wind speed increases or until drier air enters the area.

Upslope fog occurs when air blowing up a mountain slope expands and cools until the air's dew point temperature is reached. Upslope fog can occur any time of the day, but primarily occurs during the daytime and ends when the upslope wind direction changes.

The radiation and advection are regional fogs and upslope is more likely to occur in isolated areas. The rural nature of Watauga County means fog is more likely to occur over a large area. Localized features that affect fogging occurrence or duration are not substantially different between the corridors for the project alternatives. More data are needed to understand the severity, frequency, and duration of local fog occurrences. There are not enough data currently available to know whether or not the fog in Blowing Rock is any worse than anywhere else in the region or whether it warrants more attention than anywhere else in the region. (Golder & Associates, 2000)

3.10 Ecological Resources

3.10.1 Terrestrial Resources

Topography

The project area is situated in the Blue Ridge physiographic province. Topographically, the project area can be separated into two regions. The southern and eastern portions of the project area include the eastern escarpment of the Blue Ridge Mountains and are characterized by steep, deeply dissected slopes. The northern and western portions of the project area, the Blue Ridge Plateau, are above the Blue Ridge escarpment where topography is much less severe. This region is characterized by undulating terrain with scattered knobs, ridges, and low mountains. Elevations range from a low of approximately 2,830 feet (mean sea level (MSL) at Bailey Camp Creek to a high of approximately 3,890 feet MSL near the Blowing Rock Assembly grounds.

Geology, Minerals, and Soils

Blowing Rock is within the Blue Ridge Geologic Province, more specifically, the Grandfather Mountain Window. The project area is underlain predominantly by lateral belts of Blowing Rock gneiss (NCDNRCD, 1985). In Cambrian time, about 550 million years ago, riverine sediments were deposited along the edge of the continent; while concurrently, offshore ocean sediments were mixed with magma and crystallized into various igneous rocks. Through two major mountain building episodes, the sedimentary rock and deeply buried rock were thrust up in a complex mixture of granite, gneiss, volcanic, and sedimentary rock that were compressed, broken, faulted, and twisted into folds. For the past 90 million years, erosion and weathering have reduced the once lofty mountains into the present-day landscape of the Blue Ridge Mountains (Division of Land Resources, 1999). The Grandfather Mountain Window is a hole through the various thrust sheets where erosion has exposed younger rocks.

Fresh rock is generally massive and discontinuities are widely spaced. In the past it has been necessary to scale loose rock and trim overhangs in some of the rock cuts along US 321 between SR 1370 (south of the project area where US 321 begins to climb out of the Yadkin River valley) and US 321 Business. In addition, there have been some serious maintenance problems at several fill locations, mainly because the original embankments were constructed on extremely steep slopes with poor material that was not sufficiently compacted.

In general, there is very little potential for pyritic shale in the project area (pyritic shale leaches acid when disturbed by construction). During geotechnical investigations associated with final design, the North Carolina Department of Transportation (NCDOT) will screen existing slopes and rock core samples for pyritic shale. If pyritic shale is found, the NCDOT will coordinate with federal and state fisheries and water quality control agencies in developing a plan for preventing the water quality impacts associated with the exposure of pyritic shale.

There are no known mineral resources of an economic value within the project area.

The project extends through three soil series in Caldwell County (USDA, 1989) and eight soil series in Watauga County (USDA, 1944). Soils on the steep, deeply dissected slopes of the Blue Ridge escarpment consist primarily of the Chestnut-Edneyville Association (*Typic Dystrudepts*) and Tate (*Typic Hapludults*) series in Caldwell County, and the Ashe-Chestnut complex (*Typic Dystrudepts*) and Cullasaja (*Humic Dystrudepts*) series in Watauga County. A variety of soil mapping units occur in the area around Blowing Rock (above the Blue Ridge escarpment). Ridges and slopes are mapped as the Porters-Unaka complex (*Typic Dystrudepts*) and Saunook (*Humic Hapludults*) series. Stream margins and floodplains are mapped as the Nikwasi (*Cumulic*

Humaquepts) series and the Reddies (*Oxyaquic Dystrudepts*) series. Heavily developed areas are mapped as Urban Land (*Udorthents*). No hydric soils are mapped within the project area (USDA, 1991; USDA, 1997). The following is a brief description of the nine main soil series within the project area.

Chestnut-Edneyville Association. These are moderately deep, well drained, loamy soils. Gravel and cobble is present throughout these soils, with occasional stones scattered over the surface. Chestnut and Edneyville soils commonly occur on 15 to 90 percent slopes at elevations ranging from 1,400 to 4,800 feet. These soils formed in the residuum of weathered metamorphic rock. Soft bedrock (saprolite) is within 20 to 60 inches of the soil surface. Permeability is moderately rapid. Runoff is high on steeper slopes. Erosion is a severe hazard in areas where the surface is bare or has been disturbed. These soils occur on side slopes and ridges along the Blue Ridge escarpment.

Tate Series. These are very deep, well drained, loamy soils. Flakes of mica could be prevalent in these soils. These soils occur on moderate slopes in coves and drainageways and have formed in colluvium derived from weathered metamorphic and igneous rock. Permeability is moderately rapid. Runoff is low to high depending on slope. Runoff is lower where the surface has little or no disturbance. These soils are found in drainages along the escarpment.

Ashe-Chestnut Series. These soils are moderately deep, well to somewhat excessively drained, loamy soils. Gravel, cobbles, and stones are present throughout these soils, with occasional stones scattered over the surface. Ashe and Chestnut soils commonly occur on 15 to 90 percent slopes at elevations ranging from 1,400 to 5,000 feet. They formed in the residuum of weathered metamorphic rock. Soft bedrock (saprolite) is within 20 to 40 inches of the soil surface. Permeability is moderately rapid. Runoff is low to high depending on slope. Erosion is a severe hazard in areas where the surface is bare or has been disturbed. These soils are on side slopes and ridges along the Blue Ridge escarpment.

Cullasaja Series. These consist of very deep, well drained, loamy soils. Large amounts of gravel, cobble, and stone fragments are present throughout these soils. Occasional boulders are scattered on the surface. These soils occur on toe slopes, coves, and drainageways and have formed in colluvium derived from weathered metamorphic rock. Permeability is moderately rapid. Runoff is low to medium depending on slope. Runoff is lower where the surface has little or no disturbance. These soils are found in drainages along the escarpment.

Porter-Unaka Complex. These are moderate to deep, well drained, loamy soils. Fragments of gravel, cobble, and stone could be present. Flakes of mica could be prevalent in these soils. The Porter-Unaka complex occurs on 15 to 50 percent slopes at elevations ranging from 3,000 to 5,000 feet. These soils formed in the residuum of weathered metamorphic and igneous rock. Depth to bedrock is 20 to 50 inches. Permeability is moderate, and runoff is low to high depending on slope. Runoff is much lower where the surface has little or no disturbance. Erosion is a moderate hazard in areas where the surface is bare or disturbed. The complex is extensive within the Blue Ridge Plateau above the escarpment.

Saunook Series. These consist of very deep, well-drained, sandy loam soils. These soils contain varying amounts of gravel, cobble, and stone fragments. Mica flakes could be common. These soils occur on gently sloping to steep toe slopes, benches, and coves. Slopes are commonly five to 25 percent. Saunook soils formed in colluvium derived from weathered metamorphic rock. Depth to bedrock is greater than 60 inches. Permeability is moderately rapid and runoff is very low. These soils are found primarily along toe slopes of drainageways within Blowing Rock.

Nikwasi Series. These consist of moderately deep, poorly to very poorly drained, sandy loam to loamy sand soils. Large amounts of gravel and cobble are present throughout these soils. Mica flakes could be common. These soils occur on nearly level, relatively narrow floodplains. Slopes are commonly between 0 to 3 percent. Nikwasi soils formed in recent alluvium. Depth to bedrock is greater than 5 feet. Permeability is moderately rapid and very slow to ponded runoff. These soils are found primarily along the bottom of drainageways within Blowing Rock.

Reddies Series. These consist of moderately deep, moderately drained, loamy soils. Large amounts of gravel and cobble are present in horizons, 20 to 40 inches below the surface. Mica flakes could be common. These soils occur on nearly level, relatively narrow floodplains, in the upper reaches of the watershed. Slopes are commonly between 0 to 3 percent. Reddies soils formed in recent alluvium. Permeability is moderately rapid and runoff is slow. These soils are found primarily along the upper portions of drainageways within Blowing Rock.

Urban Land. Urban land is defined as land mostly covered by impermeable surfaces such as parking lots, streets, buildings, and other structures. Urban land occurs adjacent to major roads in heavily developed areas, specifically in the vicinity of US 321 in Blowing Rock.

Plant Communities

The geography of the Mountains physiographic province provides cool temperatures, often-abundant rain, and multiple elevations, aspects, and exposures to wind and solar radiation. These factors produce varied natural environments from moist, protected coves to exposed, rocky ridges. Plant communities adapted to these conditions range from spruce-fir forests on the highest peaks to montane alluvial forests in river valleys.

The North Carolina Forest Service (NCFS) describes the Blue Ridge Escarpment and outlying foothills, from South Carolina to Virginia, as the Appalachian Highlands and Foothills Forest Legacy Area. The region is largely dominated by mountain hardwoods, with spruce-fir forests and acidic coves of eastern hemlock (*Tsuga canadensis*), tulip poplar (*Liriodendron tulipifera*), and rosebay rhododendron (*Rhododendron maximum*) also very important. On land abandoned by farmers, pine forests are common (NCFS, 2001).

The project area is in a region of contrasting land uses. The terrain north of the Blue Ridge Parkway and on the escarpment along the eastern project area boundary is primarily forested. This terrain contains a few, mostly unpaved roads. Scattered residential lots are accompanied by small agricultural and neglected pastoral fields and orchards. In contrast, the west-central portion of the project area includes the rapidly developing east side of Blowing Rock, as described in Section 3.1.4. Four broad classifications of plant communities were identified. Two natural communities were noted, including chestnut oak forest and cove forest. Two variations of disturbed land also were identified: pastoral land and urban/disturbed land.

Chestnut Oak Forest. The chestnut oak forest, as documented by Schafale and Weakley (1990), is found primarily on dry, rocky slopes and ridge tops at low to moderate elevations up to 4,000 feet. Within the project area, chestnut oak forest is found primarily along the ridges of the Blue Ridge escarpment. The canopy is dominated by rock chestnut oak (*Quercus montana*) and scarlet oak (*Quercus coccinea*). Other canopy species include northern red oak (*Quercus rubra*), yellow birch (*Betula alleghaniensis*), hickories (*Carya* spp.), red maple (*Acer rubrum*), and Carolina hemlock (*Tsuga caroliniana*). Understory trees include sourwood (*Oxydendrum arboreum*), sassafras (*Sassafras albidum*), and downy serviceberry (*Amelanchier arborea*). The shrub layer varies from open to dense thickets dominated by rosebay rhododendron (*Rhododendron maximum*).

Cove Forest. The cove forest is a diverse community, documented by Schafale and Weakley (1990) that supports a mixture of hardwoods and conifers in the canopy. This community occurs on the Blue Ridge escarpment, and northern sections of all of the bypass alternatives. The canopy is typically characterized by yellow birch, cherry birch (*Betula lenta)*, tulip poplar (*Liriodendron tulipifera*), northern red oak, red maple, American basswood (*Tilia americana*), sweet pignut hickory (*Carya glabra*), fraser magnolia (*Magnolia fraseri*), chestnut oak, and Canadian hemlock (*Tsuga canadensis*). The cove forest has a relatively open subcanopy including saplings of canopy species, umbrella magnolia (*Magnolia tripetala*), pawpaw (*Asimina triloba*), witch hazel (*Hamamelis virginiana*), hop hornbeam (*Ostrya virginiana*), and mountain maple (*Acer spicatum*).

This community can be separated into two subtypes based on orientation: rich cove forest and acidic cove forest. The rich cove forest is primarily found on south-facing slopes, which receive more sunlight and are, therefore, warmer and drier than north-facing slopes. Acidic cove forests occur on north-facing slopes, which are typically shady, cooler, and moister. The rich cove forest supports a variety of shrubs and herbs such as violets (*Viola* spp.), black cohosh (*Cimicifuga americana*), white erect trillium (*Trillium erectum*), impatiens (*Impatiens* spp), waterleaf (*Hydrophyllum virginianum*), and yellow bead lily (*Clintonia borealis*). Acidic cove forests are dominated by acid-loving, ericaceous shrubs such as rosebay rhododendron and mountain laurel (*Kalmia latifolia*).

In some areas the chestnut oak and cove forests display signs of past logging. These areas were left with sufficient cull trees and are rapidly succeeding to steady-state conditions. Therefore, these successional areas are included in this community description.

Pastoral Land. Pastoral land includes the cow and horse pastures found primarily along both sides of the Blue Ridge Parkway, near the Thunder Hill overlook, northeast of Blowing Rock. Pastoral land is the least common plant community within the project area. Pastoral land is dominated by a variety of grasses and herbs. Characteristic species include Johnson grass (*Sorghum halepense*), broomsedges (*Andropogon spp*.), five fingers (*Potentilla canadensis*), sedges (*Carex* spp.), Timothy grass (*Phleum pratense*), thistle (*Carduus* spp.), Queen Anne's lace (*Daucus carota*), asters (*Aster* spp.), and goldenrods (*Solidago* spp.).

Urban/Disturbed Land. Urban/disturbed land includes areas developed and maintained for residential, commercial, and industrial use, as well as man-made ponds, maintained right-of-ways, and roads and roadside margins. This community has been substantially altered from natural conditions and includes common horticultural species such as white pine (*Pinus strobus*), rosebay rhododendron, flowering cherry (*Prunus* sp.), and Canadian hemlock. Lawns containing a variety of turf grasses are common around residential and commercial buildings.

Rare/Unique Natural Areas

There are no designated rare or unique natural areas identified within the project area according to Natural Heritage Program (NHP) records. However, the NHP has designated two areas within 2.0 miles of the project area as Significant Natural Heritage Areas (SNHA). The South Fork New River Aquatic Habitat is on a section of Middle Fork along US 321, approximately 1.0 mile north of Aho Road, the terminus of Bypass Alternatives 4A and 4B. Blowing Rock Cliff is approximately 0.2 mile south of *The Blowing Rock* (NCDPR, 1997). The SNHA designation offers no formal protection, but such resources are recognized as unique areas and could come under protection in the future. There are no water bodies deserving of special attention as denoted under the federal Wild and Scenic Rivers Act of 1968 (Pub. L. No. 90-542, 82 Stat. 906;

codified and amended at 16 U.S.C. 1217-1287 [1982]) or under the North Carolina's Natural and Scenic Rivers Act of 1971 (G.S. 113A-30).

Wildlife

The project area consists of a mosaic of urban/residential areas, deciduous forest, and pastoral land. These plant communities offer the necessary components (food, water, cover) to support a wildlife species typical of the Blue Ridge region of the state. Transecting streams and gallery forests offer potential wildlife travel corridors, while existing roads and fencing provide obstacles to wildlife movement. Animals may live on land (terrestrial) or in the water (aquatic). Each species has evolved specialized anatomical features and behavioral strategies in order to adapt to a particular environment. Some species find adequate or optimum habitat in urban settings where human modification to natural vegetation is dominant. Other species prefer pastoral, open, or edge habitat. The majority of wildlife species requires a variety of natural or relatively undisturbed forest cover.

Mammals. Plant communities within the project area provide suitable habitat for a diverse mammal population. During field studies, tracks or observations were documented for Virginia opossum (*Didelphis virginiana*), eastern cottontail (*Sylvilagus floridanus*), woodchuck (*Marmota monax*), raccoon (*Procyon lotor*), and white-tailed deer (*Odocoileus virginianus*). Other species expected in and around areas of human development include eastern pipistrelle (*Pipistrellus subflavus*), eastern gray squirrel *(Sciurus carolinensis*), Norway rat (*Rattus norvegicus*), Allegheny woodrat (*Neotoma magister*), eastern mole (*Scalopus aquaticus*), eastern spotted skunk (*Spilogale putorius*), striped skunk (*Mephitis mephitis*), and house mouse (*Mus musculus*).

Open areas associated with larger streams, pastures, roadsides, and along woodland borders provide habitat for eastern red bat (*Lasiurus borealis*), meadow vole (*Mocrotus pennsylvanicus*), star-nosed mole (*Condylura cristata*), southeastern shrew (*Sorex longirostris*), least shrew (*Cryptotis parva*), hispid cotton rat (*Sigmodon hispidus*), short-tailed deer mouse (*Peromyscus maniculatus*), and red fox (*Vulpes vulpes*).

Mammals typical of hardwood forests in this region of North Carolina include masked shrew (*Sorex cinereus*), hairy tailed mole (*Parascalops breweri*), eastern mole (*Scalopus aquaticus*), New England cottontail (*Sylvilagus obscurus*), southern flying squirrel (*Glaucomys volans*), southern red-backed vole (*Clethrionomys gapperi*), white-footed mouse (*Peromyscus leucopus*), wild pig (*Sus scrofa*), bobcat (*Lynx rufus*), and black bear (*Ursus americanus*).

Birds. The presence of both forested and open communities, and variation in altitude, aspect, and moisture regime, have resulted in a diversity of habitats available to birds. Bird species observed during field work include common raven (*Corvus corax*), wild turkey (*Meleagris gallopavo*), northern cardinal (*Cardinalis cardinalis*), Carolina chickadee (*Poecile carolinensis*), white-throated sparrow (*Zonotrichia albicollis*), brown creeper (*Certhia familiaris*), white-breasted nuthatch (*Sitta caroliniana),* song sparrow (*Melospiza melodia*), winter wren (*Troglodytes troglodytes*), Carolina wren (*Thryothorus ludovicianus*), purple finch (*Carpodacus purpureus*), ruby-crowned kinglet (*Regulus calendula*), American crow (*Corvus brachyrhynchos*), blue jay (*Cyanocitta cristata*), eastern towhee (*Pipilo erythrophthalmus*), cedar waxwing (*Bombycilla cedrorum*), and dark-eyed junco (*Junco hyemalis*).

The large expanse of deciduous oak forest on the escarpment is particularly suitable for forest interior bird species. Birds of oak forests could vary considerably depending on elevation, maturity and species distribution in a particular area. Species associated with these forests include sharp-shinned hawk (*Accipiter striatus*), eastern screech owl (*Otus asio*), hairy

woodpecker (*Picoides villosus*), downy woodpecker (*Picoides pubescens*), Acadian flycatcher (*Empidonax virescens*), eastern wood pewee (*Contopus virens*), blue jay, Carolina chickadee, and tufted titmouse (*Baeolophus bicolor*). Other species in oak forest include white-breasted nuthatch, eastern phoebe (*Sayomis phoebe*), wood thrush (*Hylocichla mustelina*), rose-breasted grosbeak (*Pheucticus ludovicianus*), red-eyed vireo (*Vireo olivaceus*), and gray catbird (*Dumetella carolinensis*). Notable bird species are the large number of migrant warblers represented, including black-and-white warbler (*Mniotilta varia*), black-throated green warbler (*Dendroica virens*), worm-eating warbler (*Helmitheros vermivorus*), black-throated blue warbler (*Dendroica caerulescens*), blue-headed vireo (*Vireo solitarius*), ovenbird (*Seiurus aurocapillus)*, and hooded warbler (*Wilsonia citrina*).

The avifauna of cove forest is quite diverse and includes most of the species mentioned in oak forests. Additional birds present during late spring and summer are blue-gray gnatcatcher (*Polioptilla caerulea*), northern parula (*Parula americana*), and summer tanager (*Piranga rubra*). Within the cove forest, small, cool streams characterized by pools and rapids are often lined with characteristic riparian forest species including hemlock and an understory of rhododendron and mountain laurel. Blackburnian warbler (*Dendroica fusca*) and Canada warbler (*Wilsonia canadensis*) find suitable habitat in these areas.

Floodplain forest is present along larger streams west of the escarpment, and supports early successional vegetation, such as black willow (*Salix nigra*), river birch (*Betula nigra*), and alders (*Alnus serrulata*). Summer breeders associated with floodplains include white-eyed vireo (*Vireo griseus*), yellow-throated vireo (*V. flavifrons*), warbling vireo (*V. gilvus*), yellow warbler (*Dendroica petechia*), northern oriole (*Icterus galbula*), and Louisiana water thrush (*Seiurus motacilla*). Birds expected in association with larger streams include wood duck (*Aix sponsa*), belted kingfisher (*Megaceryle alcyon*), and spotted sandpiper (*Actitis macularia*).

Disturbed areas such as old fields, successional plant communities, and urban development are prominent in and around Blowing Rock. The original forests in these areas were removed or the canopy was interrupted. A variety of birds occur within these areas, including turkey vulture (*Cathartes aura*), northern bobwhite (*Colinus virginianus*), mourning dove (*Zenaida macroura*), barn swallow (*Hirundo rustica*), northern mockingbird (*Mimus polyglottos*), American crow, European starling (*Sturnus vulgaris*), American robin (*Turdus migratorius*), indigo bunting (*Passerina cyanea*), house wren (*Troglodytes aedon*), song sparrow, red-tailed hawk (*Buteo jamaicensis)*, and horned lark (*Eremophila alpestris*).

Amphibians and Reptiles. No terrestrial amphibian or reptile was observed during field studies. Amphibians expected within the project area include numerous salamanders, toads, and frogs. The numerous streams and seepages within the project area provide suitable habitat for breeding. The salamander fauna, in particular, is expected to be diverse and could include spotted salamander (*Ambystoma maculatum*), seal salamander (*Desmognathus monticola*), mountain dusky salamander (*Desmognathus ochrophaeus*), pigmy salamander (*Desmognathus wrighti)*, two-lined salamander (*Eurycea bislineata*), four-toed salamander (*Hemidaactylium scutatum*), and redback salamander (*Plethodon cinereus*) among others. Primarily terrestrial amphibians and reptiles known to occur in the region include American toad (*Bufo americanus*), Fowler's toad (*Bufo woodhousii*), spring peeper (*Pseudacris crucifer*), green frog (*Rana clamitans*), wood frog (*Rana sylvatica*), eastern box turtle (*Terrapene carolina*), five-lined skink (*Eumeces fasciatus*), eastern fence lizard (*Sceloporas undulatus*), worm snake (*Carphophis amoenus*), northern black racer (*Coluber constrictor*), southern ringneck snake (*Diadophis punctatus*), rat snake (*Elaphe obsoleta*), eastern milk snake (*Lampropeltis triangulatum)*, northern water snake (*Nerodia*

sipedon), queen snake (*Regina septemvittata*), eastern garter snake (*Thamnophis sirtalis*), northern copperhead (*Agkistrodon contortrix*), and timber rattlesnake (*Crotalus horridus*).

Game Species. The North Carolina Inland Fishing, Hunting, and Trapping Regulations Digest (NCWRC, 2000) indicates that big game successfully hunted in Watauga and Caldwell Counties include white-tailed deer, black bear, wild pig, and wild turkey. Of these species, white-tailed deer and wild turkey were observed within the project area. Black bear and wild boar are expected within the bypass alternative corridors particularly on the escarpment. Other primary game species known to occur within the project area are groundhog, eastern cottontail, gray squirrel, bobcat, and raccoon.

Regional Land Cover

Table 3-17 gives the 1992 percentages of land by cover types in the major river subbasins contained in the project area. (Section 3.10.2 describes the subbasins, their component streams, and boundaries.) In the South Fork New River and Upper Yadkin, land use was primarily forest and agriculture. Urban and built-up land was more abundant in the Upper Catawba River subbasin.

Within the three major river drainages containing the project area, acreages of cultivated crops and forestland have declined, while urban and built-up lands have increased. Table 3-18 indicates the changes between 1982 and 1992.

Table 3-17. Percent of Major Land Cover Types in Regional Sub-Basins

Subbasin	Cultivated Crops	Uncultivated Crops	Pasture	Forest	Urban/ Built-up	Other[1]
South Fork New River	2.0%	6.0%	25.0%	53.0%	6.0%	8.0%
Upper Yadkin	13.0%	3.2%	15.5%	50.9%	9.8%	7.2%
Upper Catawba	3.6%	3.4%	5.9%	49.4%	20.0%	17.6%

[1] "Other" category includes rural transportation and open water.
Sources: NCDWQ, 1997b, 1999b, 2000a

Table 3-18. Changes In Land Cover in Regional Sub-Basins 1982 to 1992

River Basin	Cultivated Crops	Uncultivated Crops	Pasture	Forest	Urban/ Built-up	Other
New	-51.5%	+17.7%	-3.1%	-1.4%	+37.3%	+8.8%
Yadkin	-24.8%	-22.1%	+19.4%	-3.2%	+37.7%	+26.9%
Catawba	-37.7%	+12.2%	-4.7%	-5.6%	+35.1%	+3.7%

Sources: NCDWQ, 1997b, 1999b, 2000a

In the last four decades, the amount of developed land within the limits of the Town of Blowing Rock has increased. NCDOT aerial photos of The Blowing Rock vicinity taken in 1961 and 1994 show increasing residential development at the edges of the town and increased density towards the center of the town. Also apparent is the incursion of new roads onto the Blue Ridge Escarpment.

Forestry and Farming

In 1997, agriculture involved the smallest part of the workforce in Watauga County, with 0.6 percent, or 91 workers (see Table 3-7). In 1997, 28 percent of the county's land (56,508 of 200,038 acres) consisted of farms, with an average farm size of approximately 84 acres. Cash receipts from farming in 1998 were $24 million, placing Watauga County 73rd in North Carolina in agricultural production (NCDACS, 2000). In contrast, gross retail sales in the county for fiscal year 1998 to 1999 were $672 million.

In 1997, agriculture was the smallest part of Caldwell County's workforce with less than 100 workers (see Table 3-7). In 1997, 12 percent of the county's land (37,050 of 301,875 acres) consisted of farms, with the average farm size being 112 acres. Cash receipts in 1998 were $51 million, placing Caldwell County 43rd in North Carolina in agricultural production (NCDACS, 2000). The county's gross retail sales in fiscal year 1998 to 1999 were $666 million.

Forestry is the second largest industry in the state, contributing over $20 billion annually to the state's economy and providing 144,000 jobs for North Carolinians (North Carolina Cooperative Extension, 1997). In Watauga and Caldwell Counties, 64 and 75 percent, respectively, of the county's acreage is managed as timberland (Table 3-19).

Table 3-19. Forested Land And Managed Timberland

County		Watauga (000s)	Caldwell (000s)
Total Acreage		200.0	301.9
Total Forested Land (acres)		137.5	226.9
Area of Timberland by Ownership Class (acres/hectares)	All Ownership	128.7	226.8
	Federal Government	0.4	49.3
	State Government	0.0	0.0
	County and Municipal	0.0	0.0
	Forest Industry	128.3	177.5

Source: North Carolina Forest Service. 2004. *Forest Statistics for North Carolina, 2002*.

Wildlife Habitat Trends

In the immediate vicinity of Blowing Rock, forest habitat has been steadily depleted by development. Historic aerial photographs illustrate encroaching development in areas that were forested in 1961. Historic aerial photographs also show that roads have increasingly invaded forested areas. New roads provide pathways for the invasion of weedy, exotic plant species such as kudzu (*Pueria lobata*) and princess tree (*Paulownia tomentosa*). Pathogenic fungi, diseases, and insects are also afforded access to forest interiors by new roads.

Population growth, the growth of tourism and recreation interests, and the increasing value of land for residential lots have brought changes to the character of wildlife habitat in and around Blowing Rock. Development projects have extended farther into previously remote forested areas. The resulting fragmentation of large forest tracts favors edge-adapted species like raccoons, blue jays and white-tailed deer. Meanwhile, more reclusive animals like black bears and wood thrushes are pushed into smaller tracts of habitat.

Hunting

White-tailed deer harvests have steadily increased from 1980 to 1999 in Watauga and Caldwell Counties. In Watauga County, the harvest increased from 21 to 653 deer (antlered and button bucks and does) in the two decades, and from 178 to 853 deer in Caldwell County (correspondence from V. Evin Stanford, Deer Biologist, NCWRC, January 22, 2001). While increase in human and deer populations can account for a portion of this harvest increase, deer hunting as a recreational activity is clearly becoming more important. In addition to white-tailed deer, the North Carolina Wildlife Resources Commission (NCWRC) notes that black bear, wild pig, and wild turkey are hunted in Watauga and Caldwell Counties (NCWRC, 2000). Smaller game species in the region are gray squirrel, eastern cottontail, bobcat, raccoon, bobwhite, and mourning dove.

Hunting is conducted on the federally managed Pisgah Game Lands, on the western boundary of the Town of Blowing Rock. The Game Lands are contained in the Pisgah National Forest, to the west and south of the project area, and stretch into Buncombe County. Hunting is also conducted on private lands in *The Blowing Rock* area, including lands on the Blue Ridge escarpment. As development of undisturbed areas such as the Blue Ridge escarpment progresses, wildlife becomes scarcer, and hunting is eliminated as a recreational option in some areas.

3.10.2 Aquatic Resources

Smaller streams and seeps are frequent on hilly terrain such as the Blue Ridge escarpment in the eastern project area. Coves gather runoff and subterranean ground flow from adjacent ridges and collect it into small drainages that flow into larger, perennial streams. The smaller, ephemeral streams provide habitat for wetland plant communities and associated fauna, including insects, amphibians, birds and mammals. Wetlands and headwaters are often breeding areas for aquatic organisms including fish, mollusks, and amphibians. Wetlands and saturated soils adjoining these waters help absorb rain and runoff, and their vegetative cover helps to hold the soil of the mountainside in place. Small streams and wetlands in the mountains, as in other geographic provinces, help to contain floodwaters and temper the flow of precipitation pulses to the main stem of the river.

Water Resources

Water Resources and Ratings. Blowing Rock is at the divide of three major watersheds, the New River, Yadkin-Pee Dee, and Catawba. The project would directly affect streams in the New River and Yadkin-Pee Dee, with lesser impacts to streams and water resources in the Catawba watershed. Streams and drainages southeast and east of Blowing Rock on the Blue Ridge escarpment are part of the Yadkin-Pee Dee River Basin (USGS Hydrologic Unit 03040101, North Carolina Department of Water Quality (NCDWQ) subbasin 03-07-01). Streams and drainages including most of Blowing Rock, areas north of the Blue Ridge escarpment and the Blue Ridge Parkway (Blue Ridge Plateau) are part of the New River Basin (USGS Hydrologic Unit 05050001, NCDWQ subbasin 05-07-01). The Catawba watershed includes streams and

drainages south of Blowing Rock along the Blue Ridge escarpment west of US 321 (USGS Hydrologic Unit 03050101, NCDWQ subbasin 03-08-31).

Yadkin-Pee Dee Basin streams drain the Blue Ridge escarpment in a general southeastern direction. The project area's named streams within the Yadkin-Pee Dee River Basin are Martin Branch and Bailey Camp Creek (see Figure 3-9 and Appendix D). These streams are assigned a best usage classification of C Tr (NCDWQ, 2000c). The C designation denotes aquatic life propagation and survival, fishing, wildlife, secondary recreation, and agriculture. Secondary recreation refers to any activity in which bodily contact with water is on an infrequent or incidental basis. The supplemental designation Tr denotes a stream as suitable for natural trout propagation and maintenance of stocked trout.

Aho Branch and the Middle Fork of the South Fork of the New River are the only named streams within the New River Basin portion of the project area. Both streams have been assigned a best usage classification of WS-IV Tr + (NCDWQ, 2000b). Class WS-IV waters are protected as water supplies and are generally in moderately to highly developed watersheds. Discharge of treated waste is granted under permits, and local programs to control non-point source and stormwater discharge of pollution are required. These waters are also suitable for all Class C uses. The supplemental designation Tr denotes a stream as suitable for natural trout propagation and maintenance of stocked trout. The + designation indicates that these waters are subject to a special management strategy concerning stormwater controls and water quality standards in order to protect downstream waters designated as Outstanding Resource Waters (ORW).

No streams from the Catawba Basin are within the project area. However, two sections of US 321 straddle the ridge between the Catawba, Yadkin-Pee Dee, and New River watersheds. The first section includes approximately 1/2 mile of US 321 between the northern Green Park Historic District boundary in the Pinnacle Avenue area and the US 321/US 321 Business intersection. This portion of the Catawba watershed drains into headwaters of Johns River. Johns River has been assigned a best usage classification of C Tr. The second section of corridor within the Catawba Basin occurs approximately 2.0 miles south of Blowing Rock, near Greene Cemetery. A short segment of US 321 could drain into the headwaters of Left Fork Mulberry Creek. Left Fork Mulberry Creek has been assigned a best usage classification of C Tr High Quality Waters (HQW) (NCDWQ, 2000a). HQW-designated waters are rated as excellent based on biological and physical/chemical characteristics including native trout waters primary nursery areas, critical habitat, and water supply watersheds.

Designated public mountain trout waters (DPMTW) are classified for management by the NCWRC as either Wild Trout Waters or Hatchery Supported Waters. Wild Trout Waters are high quality waters that sustain trout populations by natural reproduction. Hatchery Supported Waters must be stocked periodically in order to sustain a population. They are designated by the NCWRC. DPMTW is a state fishery management classification, which provides for public access to streams on both public and private lands. DPMTW is not the same as classification as NCDWQ's Trout Waters (Tr) water quality management classification. DPMTW has no associated land use or water quality protection regulations. However, many of the DPMTW are also classified as Trout Waters and are subject to the water quality rules associated with the NCDWQ supplemental designations (Eaker, 1992).

The Middle Fork New River, extending from the Lake Chetola dam to the South Fork New River, is designated as Hatchery Supported Trout Waters. No streams within the project area are designated Wild Trout Waters.

Locations of surface waters (streams) subject to US Army Corps of Engineers (USACE) jurisdiction are depicted in Figure 3-9 and Appendix D. The crossing numbers shown in Figure 3-9 represent a jurisdictional system that may contain multiple streams and associated wetlands. Characteristics of stream crossings are presented in Table 3-20.

Sources of Water Quality Degradation. Water quality is degraded through pollution from point-source discharges, overland runoff, and toxic substances deposited from the atmosphere or through rainfall. Pollutants might be sediment, nutrients, toxic or synthetic substances, road salt, oxygen-consuming wastes, or bacteria.

Transport and redeposition of sediment are among the most essential natural processes occurring in watersheds. However, land-disturbing activities such as road and building construction, agriculture, grazing, and logging can cause more soil than usual to be detached from the land and moved by water. This can result in streams and rivers receiving more sediment than they can transport. Sediment then accumulates on streambeds, smothering fish and aquatic insect habitat. In addition, sediment buildup decreases the water storage volume of streams, rivers and lakes, resulting in more frequent floods. Suspended sediments increase the cost of treating municipal water supplies.

In the mountains of western North Carolina, where three quarters of the land has a slope exceeding 30 percent, erosion and sedimentation are major problems. Destructive sedimentation in water is accompanied by loss of topsoil and decreased soil productivity on land. Building site preparation, road construction, and other land-disturbing activities compromise the stability of soils that are shallow and subject to sliding.

Runoff from urban or developed areas carries many non-point source contaminants into streams including sediment, oil and grease from automobiles, road salt, litter, nutrients, waste materials, and atmospheric pollutants. The contaminants enter streams directly instead of being allowed to filter slowly through the soil, partly to completely decomposing as they do so. Declines in water quality are expected if 10 to 15 percent of a watershed is covered by impervious surfaces such as roads, rooftops and parking lots (NCDWQ, 2000c).

Urbanization has hydrologic effects in addition to water quality effects. Increased surface runoff leads to more frequent and intense flood pulses. These effects are exacerbated by piping of stormwaters and channelization of streams, and they lead to bank scouring and undercutting and increased sedimentation.

Wastewater discharges are another source of water quality degradation. In 1995, Middle Fork/South Fork was listed as impaired because of non-point source pollution arising from sedimentation and urban stormwater runoff and from the discharge of solids from the Blowing Rock wastewater treatment plant. NCDWQ recommended several strategies to address non-point source pollution reduction in the Blowing Rock area. In addition, improvements to the sludge disposal program were completed. The stream has since been removed from the list of impaired waters (NCDWQ, 2000a).

Sedimentation, wastewater discharge, and non-point source pollution are the three major water quality concerns in the Middle Fork/South Fork subbasin (NCDWQ, 2000a). In the Upper Yadkin subbasin, larger downstream reaches have experienced some impairment from turbidity, nutrients, and bacteria. However, the upper reaches and smaller streams in the subbasin have **Good** to **Excellent** water quality. Water quality in the upper Catawba River Basin is generally **Good** to

Figure 3-9. Section 404 Jurisdictional Areas
(Part A)

Figure 3-9. Section 404 Jurisdictional Areas

(Part B)

Table 3-20. Characteristics of Streams and Stream Crossings

Crossing Number[1]	Stream Name	Alternative Corridor	Width (feet)	Substrate Composition	Drainage Area (acres)	Stream Type[3]	Basin
1	UT[2] to Yadkin River	WA, 1A, 1B*, 4A, 4B*	8	Boulder/Cobble	30	A	Yadkin-Pee Dee
2A	UT to Yadkin River	WA, 1A*, 1B*	10	Sand/Gravel – Boulder/Cobble	40	C, A	Yadkin-Pee Dee
2B	UT to Yadkin River	WA	8	Cobble/Sand	10	B	Yadkin-Pee Dee
3	UT to Middle Fork	WA	3	Sand/Gravel	10	C	Yadkin-Pee Dee
4	Middle Fork	WA	15	Cobble/Sand	630	B, C	New River
5	UT to Middle Fork	WA	8	Cobble/Bedrock	10	B	New River
6	Middle Fork	1A*, 1B*	10	Cobble /Sand	120	B, C	New River
7A	UT to Middle Fork	1A, 1B	12	Cobble/Sand	110	C	New River
7B	UT to Middle Fork	1A, 1B	3	Boulder/Bedrock	10	B	Yadkin-Pee Dee
8A	Bailey Camp Creek	4A*, 4B*	12	Boulder/Cobble	210	Cb	Yadkin-Pee Dee
8B	UT to Bailey Camp Creek	4A*, 4B*	5	Cobble/Gravel	10	Bc	Yadkin-Pee Dee
9	UT to Yadkin River	4A, 4B*	12	Bedrock/Boulder	40	A	Yadkin-Pee Dee
10	UT to Yadkin River	4A, 4B*	15	Bedrock/Boulder	90	A	Yadkin-Pee Dee
11	UT to Yadkin River	4A, 4B*	8	Boulder/Cobble	10	A	Yadkin-Pee Dee
12	UT to Yadkin River	4A*, 4B	10	Boulder/Cobble	30	A	Yadkin-Pee Dee
13	UT to Martin Branch	4B	12	Boulder/Cobble	20	A	Yadkin-Pee Dee
14	UT to Martin Branch	4A, 4B*	10	Boulder/Cobble	30	A	Yadkin-Pee Dee
15	UT to Martin Branch	4A	10	Boulder/Cobble	20	A	Yadkin-Pee Dee
16	UT to Martin Branch	4A, 4B	10	Boulder/Cobble	20	A	Yadkin-Pee Dee
17	Martin Branch	4A, 4B*	8-15	Bedrock/Boulder	40	A	Yadkin-Pee Dee
18	UT to Martin Branch	4A, 4B	12	Boulder/Cobble	30	A	Yadkin-Pee Dee
19	UT to Aho Branch	4A, 4B	10	Cobble/Gravel	10	B	New River
20A	UT to Aho Branch	4A, 4B*	8-20	Cobble/Gravel	10	B	New River
20B	UT to Aho Branch	4A, 4B*	20	Cobble/Gravel	10	B	New River
21	UT to Aho Branch	4A, 4B*	8	Cobble/Gravel	20	B	New River
22	UT to Aho Branch	4A, 4B	8-15	Cobble/Gravel	30	B	New River
23A	UT to Aho Branch	4A*, 4B*	15	Cobble/Gravel	230	C	New River
23B	Aho Branch	4A*, 4B*	15	Cobble/Gravel	900	C	New River
24	Middle Fork	4A*, 4B*	60	Cobble/Gravel	4,580	C	New River

* Refers to crossings proposed for bridging

[1] "Crossing Number" refers to Jurisdictional Crossing Numbers in Figure 3-9.

[2] "UT" indicates an unnamed tributary.

[3] Stream type follows criteria as described by Rosgen (1996).

Excellent. No major water quality problems exist. Johns River and Mulberry Creek are pristine waters that depend on continued careful management to maintain their high-quality status.

Drinking Water Supply. The Blowing Rock Water Supply System is based in the waters of Lake Chetola, with a capacity of 45.0 million gallons (MG). The average daily water use is 0.313 million gallons per day (MGD). Based on a projected usage of 0.515 MGD in 2010 and 0.674 MGD in 2020, the demand for water will exceed its supply within the next 10 years. Bass Lake, to the northwest of Lake Chetola, has been proposed as an alternate water source to meet Blowing Rock's increased demands for water in the future (NCDWR, 2000). However, Bass Lake does not have the capacity to meet these needs, based on a withdrawal of 10 percent of the 20-day low flow volume of the lake. Proposed alternative sources of drinking water are the headwaters of the Yadkin River and Middle Fork/South Fork north of Blowing Rock, which is currently in use as a water supply for Boone (conversation with Wayne Greene, Blowing Rock zoning administrator, January 22, 2001).

Wastewater Management. In 1992, the Blowing Rock wastewater treatment plant averaged 0.22 MGD of discharges into Middle Fork/South Fork. Total permitted discharge capacity is 0.80 MGD (discharge permit number NC0027286) (NCDWR, 2000).

The Town of Blowing Rock is expanding its sewer lines. The purpose of this expansion is to provide sanitary wastewater disposal and to provide a more effective alternative to septic tank systems for sewage disposal. Septic systems often operate at less than optimal capacity in the steep, often shallow soils typical in the Blowing Rock area. Failure of these systems becomes a non-point source of bacterial water pollution. The Town of Blowing Rock's sewer expansion program is progressing with most of the residential and commercial areas within the town limits being placed on-line as funds permit (Town of Blowing Rock, 1993). Expansions in the project area include Green Hill, Green Hill Road, Pinnacle Avenue, Wonderland Drive, Possum Hollow Road, and the Country Club Drive area.

Watershed Protection and Regulations. A permit is required from the North Carolina Environmental Management Commission for causing or permitting any pollutant to enter into a defined managed area of state waters for the maintenance or production of harvestable freshwater, estuarine, or marine plants or animals (General Statute 143-215.1). This statute is pertinent to most of the stream waters affected by project activities, which maintain natural and/or stocked populations of trout.

As a result of new stormwater rules enacted by the US Environmental Protection Agency (USEPA) in 1999, construction or land development activities that disturb 1.0 acre or more of land are required to obtain a National Pollutant Discharge Elimination System (NPDES) stormwater permit. The NPDES Stormwater Program is a national program for addressing the non-agricultural sources of stormwater discharges that adversely affect the quality of the nation's waters. The permitting mechanism requires the implementation of controls designed to prevent harmful pollutants from being washed by stormwater runoff into local water bodies. An erosion and sediment control plan must also be developed for these sites under the state's Sedimentation Pollution Control Act administered by the North Carolina Division of Land Resources. Site disturbances of less than 1.0 acre are required to use Best Management Practices (BMPs), but a permit is not required.

Wildlife

Amphibians and Reptiles. Streams, seepages, and wetlands provide habitat for numerous aquatic and semi-aquatic wildlife species. The eastern newt (*Notophthalmus viridescens*) is the only

aquatic amphibian or reptile observed during field surveys. Aquatic wildlife expected to be present include hellbender (*Cryptobranchus alleganiensis*), shovelnose salamander *(Leurognathus marmoratus*), northern dusky salamander (*Desmognathus fuscus*), blackbelly salamander (*Desmognathus quadramaculatus*), spring salamander (*Gyrinophilus porphyriticus*), snapping turtle (*Chelydra serpentina*), bullfrog (*Rana catesbeiana*), and northern water snake (*Nerodia sipedon*).

Fish. Low-gradient, riffle-pool streams, such as Middle Fork and Aho Branch, are expected to support a more diverse fishery than smaller, high-gradient tributaries. Fish species expected to occur in larger streams include central stoneroller (*Campostoma anomalum*), rosyside dace (*Clinostomus funduloides*), shiners (*Notropis* spp.), Kanawah minnow (*Phenacobius teretulus*), creek chub (*Semotilus atromaculatus*), white sucker (*Catostomus commersoni*), mottled sculpin (*Cottus bairdi*), rock bass (*Ambloplites rupestris*), and darters (*Etheostoma* spp.). Fish species expected to occur in high gradient streams include blacknose dace (*Rhinichthys atratulus*), longnose dace (*R. cataractae*), and northern hog sucker (*Hypentelium nigricans*).

Three dominant species of freshwater trout are found in mountain steams: brook trout (*Salvelinus fontinalis)*, rainbow trout (*Salmo gairdneri*), and brown trout (*Salmo trutta*). The Middle Fork New River, extending from Lake Chetola dam to South Fork New River, is designated as Hatchery Supported Trout Waters. No streams within the project area are designated Wild Trout Waters. Other game fish found in Middle Fork include smallmouth bass (*Micropterus dolomieu*), largemouth bass (*Micropterus salmoides*), and bluegill (*Lepomis macrochirus*).

Habitat Trends. Increased resource use has altered streamflows and lake levels and degraded water quality. Wild brook trout, freshwater mussels, and other aquatic species have declined in response to these factors. Physical causes of in-stream habitat degradation include sedimentation, bank erosion, channelization, lack of riparian vegetation, loss of pool and riffle structure, and streambed scour. Typically, degraded streams occur in areas with a large amount of land-disturbing activities (urbanization, construction, mining, timbering, and agriculture) or a large percentage of impervious surfaces. Streams that receive a discharge much greater or less than the natural flow often experience degraded habitat as well. Stocking of wild and imported trout species is intended to restore fish numbers, but other species, and the interdependent balance of species, depend on high-quality habitat.

Fishing

The NCWRC stocks brook, rainbow and brown trout in Middle Fork/South Fork, downstream of Lake Chetola, from March through August of each year. According to the NCWRC, many of the small headwater streams in the project area also support wild brook trout populations. The NCDWQ rates headwater creeks of the Yadkin River, Johns River, and Mulberry Creek as trout waters. Some of the other game fish present in area waterways are largemouth and smallmouth bass, crappie (*Pomoxis* spp.), sunfish (*Lepomis* spp.), and muskellunge (*Esox masquinongy*).

Section 404 Jurisdictional Areas

Section 404 of the Clean Water Act requires regulation of discharge into “Waters of the United States” for public and private discharges. Although the principle administrative agency of the Clean Water Act is the USEPA, the USACE has major responsibility for implementation, permitting, and enforcement of provisions of the Act. The USACE regulatory program is defined in Title 33, parts 320-330 of the *Code of Federal Regulations* (33 CFR 320-330).

Water bodies such as rivers, lakes, and streams are subject to jurisdictional consideration under the Section 404 program. However, by regulation, wetlands are also considered "Waters of the United States." Wetlands are described as:

> Those areas that are inundated or saturated by groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas. (33 CFR 328.3(b) [1986]).

Wetlands are defined by the presence of three criteria: hydrophytic vegetation, hydric soils, and evidence of wetland hydrology during the growing season (USACE, 1987). Open water systems and wetlands receive similar treatment and consideration with respect to Section 404 review. Most of the project area jurisdictional areas consist of surface waters in bank-to-bank streams or isolated ponds.

Jurisdictional areas within the construction footprints of the project alternatives were delineated and located using Global Positioning System (GPS) and laser technology in November and December of 1999 and November of 2000. The delineation was approved by the USACE (Mr. Steve Lund, Asheville Regional Field Office) after a field visit on December 4, 2000. The general locations of jurisdictional areas within the project area are indicated in Figure 3-9.

Rivers and streams within the project area are riverine in nature as defined by Cowardin *et al*. (1979), while wetlands in the project area are palustrine in nature. Jurisdictional areas in the project area include primarily surface waters in bank-to-bank streams and vegetated wetlands.

Wetlands. Vegetated wetlands are limited in extent within the project area, and occur primarily as two types: forested wetlands and herb-dominated wetlands. Forested wetlands are found in relatively undisturbed bottomland hardwood communities that receive periodic, overbank flooding from adjacent streams. These bottomland wetlands are considered palustrine, forested, broad-leaved deciduous/needle-leaved evergreen semi-permanently flooded (PFO 1/4F) systems. Within the project area, this wetland type is localized in the floodplain of the Middle Fork, in eastern Blowing Rock (Figure 3-9A, crossing number 6). The canopy is characterized by a variety of mesic hardwood and evergreen species. A dense thicket of rosebay rhododendrons is common throughout the understory. Many herbs and mosses adapted to wetland hydrology carpet these wetlands. Soils are seasonally saturated from adjacent groundwater slopes and receive periodic flooding during overbank events. Bottomland hardwood wetlands support a wide variety of habitats because of structural diversity, variation in topography, and proximity to riffle-pool streams. This system also receives overland runoff from recent residential development, roads, and active pastureland upstream. Functionally, these wetlands provide flood flow attenuation, nutrient removal, production export, sediment/toxicant retention, and a variety of habitats, including temporary surface water, for local fish and wildlife.

Herb-dominated wetlands are small, and occur adjacent to streams and as isolated systems. These wetlands are the result of recent disturbance and are dominated by early-successional vegetation. Herb-dominated wetlands occur in two areas. Two small wetlands occur adjacent to US 321 above the last series of curves south of Blowing Rock (Figure 3-9B, crossing number 2). The extent of these wetlands is partially because of the maintenance of vegetation from roadside clearing. Soils are saturated from adjacent groundwater seepage and periodic flooding during overbank events. These systems also receive overland surface runoff from the adjacent road network. These wetlands support a diverse herbaceous layer and scattered shrub vegetation.

Several herb-dominated wetlands have formed in association with a breached impoundment near the confluence of Aho Branch with Middle Fork (Figure 3-9A, crossing number 23), and two of these wetland areas would occur within the Bypass Alternative 4 corridor. Wetland soils have formed as a result of the impounded waters. Currently, the site is drying, with primarily low depressional areas and abandoned stream channels containing wetland hydrology. Soils are saturated from adjacent groundwater seepage and overland surface runoff from the adjacent floodplain and uplands. These wetlands support an early-successional vegetation community. Dominant plants in the wetter areas are cat-tail (*Typha* sp.), rushes (*Juncus* spp.), sedges (*Carex* spp.), and knotweeds (*Polygonum* spp.)

Herb-dominated wetlands adjacent to streams receive high volumes of short-duration flow following precipitation events. Herb-dominated wetlands without adjacent streams perform limited functions for the ecosystem. Sediment buildup adjacent to the stream indicates that these wetlands function as sediment and nutrient traps, flood-flow attenuation, pollutant sinks. These wetlands also provide drinking water for wildlife, and habitat for aquatic and semi-aquatic organisms.

The NC Division of Water Quality (DWQ) (formerly the NC Division of Environmental Management) (NCDEM 1995) has prepared a wetlands assessment procedure entitled *Guidance for Rating Wetlands in North Carolina*. The most recent version (fourth) of this procedure was released in January 1995. The NCDOT considers this method as a standard procedure for assessing wetlands proposed for roadway impacts. This procedure was used to rate each wetland identified within the project area (crossing numbers 2, 6, and 23 on Figure 3-9). This procedure was not used to rate the jurisdictional areas that are bank-to-bank streams.

The DWQ procedure rates wetlands according to six functional attributes: water storage, bank/shoreline stabilization, pollutant removal, wildlife habitat, aquatic life value, and recreational/educational value. Each attribute is given a rating of from "1" to "5." A higher rating for a functional attribute indicates a higher value for that attribute to the environment. A different multiplier is used with each attribute so that the highest possible sum of the six products is "100." These attributes are weighted (by the multiplier) to enhance the results in favor of water quality functions. Pollutant removal is weighted as the most important wetland attribute. Water storage, bank/shoreline stabilization, and aquatic life functions are given equal weight as secondary attributes, and wildlife habitat and recreation/education functions are given minimal credit.

The forested wetland associated with Middle Fork (crossing number 6) rated a 64 on a scale from 0 to 100. The herb-dominated wetlands along US 321 (crossing number 2) and within the breached impoundment (crossing number 23) rated 55 and 29, respectively. Results of the NCDWQ procedure analysis for the three project area wetlands indicate that large wetland systems generally rate higher than smaller systems. Also, wetlands that are positioned below discharge areas, and thereby treat man-induced run-off, rate higher than wetlands of equal or higher quality in undisturbed sites. Inferences regarding the effect of disturbance on these wetlands and the isolated or adjacent nature of the wetlands are not readily apparent from the analysis. Completed NCDWQ Wetland Rating Worksheets are included in Appendix A of the project's *Natural Systems Report* (EcoScience, Inc., April 2001).

Streams. Three categories of streams were identified within the project area: headwater seeps, step-pool streams, and riffle-pool streams. Streams are primarily bank-to-bank, surface water

systems and are considered riverine, upper perennial, unconsolidated bottom, and permanently flooded (R3UBH) systems. A description of each type is given below.

Headwater Seeps. Headwater seeps are small, poorly defined streams that receive constant (or regular) groundwater seepage. The presence of these streams is often related to a strike and dip of metamorphic foliation or fractures in the underlying rock. Headwater seeps vary in width from 8 to 20 feet, and are very shallow and slow flowing. Streambed substrate is primarily cobble and small stones. Headwater seeps are found throughout the project area.

A variety of amphibian species are expected to be regular inhabitants in these shallow, cold, slow moving waters. Frogs, toads, and salamanders, including American toad, upland chorus frog, longtail salamander, spring salamander, northern red salamander, northern dusky salamander, two-lined salamander, and mountain dusky salamander will feed and lay eggs in seepage areas. Fewer reptiles would be found at these elevations, but the painted turtle and northern water snake could frequent these habitats. Many species of birds and mammals use headwater seeps as a source of drinking water as well as foraging sites for small aquatic and semi-aquatic species (invertebrates, amphibians).

Step-Pool Streams. Step-pool streams are characterized by high gradient "step-pool" drainages composed of boulders and large rocks. Valley slopes and side slopes along these streams often exceed 40 percent. These streams are shallow and contain moderately to rapidly flowing waters. Flows within these streams are flashy, dependent upon recent rainfall events. These streams are highly variable in width, averaging approximately 6 to 12 feet wide along most sections to greater than 30 feet where streams spill over large faces of stone. Streams of this type are found primarily along the escarpment and steeper slopes within the Blowing Rock plateau.

Water flow through these systems is often too fast to support a high diversity of aquatic wildlife; however, there are a few species that thrive in the fast currents and sporadic pools. Small fish, such as blacknose dace, longnose dace, whitetail shiner (*Cyprinella galactura*), spotfin shiner (*C. spiloptera*), and northern hog sucker occur in these systems. Salamanders, including the seal, two-lined, and blackbelly, are also prevalent along these streams. Salamanders live and lay eggs on the rocks in and adjacent to these streams and feed on both aquatic and terrestrial invertebrates. Invertebrates live and thrive on or under rocks in the cold, fast-flowing, and well-oxygenated water.

Riffle-Pool Streams. Riffle-pool streams are the larger systems found in the gently sloping valleys of the Blue Ridge Plateau. These streams typically have a well-defined bed and banks; are moderately to strongly meandering; contain a definite riffle-pool sequence; and have a channel substrate of primarily gravel-, cobble-, and boulder-sized material. These streams vary in width to over 60 feet.

The riffle-pool stream provides a variety of habitats because of the variation in water depth, current velocity, and substrate particle size. Rock bass occur where water is deep and slow flowing; while many species, including the central stoneroller, greenfin darter (*E. chlorobranchium*), New River shiner (*Notropis scabriceps*), and fantail darter (*Etheostoma flabellare*), occur in areas with higher velocities. Large streams provide habitat for game fish (e.g., brown trout, rainbow trout, small-mouth bass), as well as the various types of prey on which they feed (smaller fish, invertebrates, aquatic plants, and algae). Streams supporting a diverse fishery also support predatory reptiles, birds, and

mammals. Many reptiles and amphibians utilize the shallow, fast-flowing portions of mountain streams (e.g., queen snake, hellbender), while others could occur in slow current or pool areas near banks and aquatic vegetation (northern water snake, shovelnosed salamander, and blackbelly salamander).

404 Jurisdictional Area Trends. Wetlands and open waters are inevitably affected by ongoing development. In *The Blowing Rock* area, streams have been bridged, straightened, dammed, and filled in. However, substantial areas of free-flowing streams remain in and near Blowing Rock, especially in more undisturbed locations like the Blue Ridge escarpment.

The USACE Asheville field office and Wilmington District office were contacted concerning recent trends in impacts to Section 404 jurisdictional areas (wetlands and open waters) in the project vicinity; however, the requested information on dredge and fill permits is currently not available. Examination of NCDOT files for Watauga and Caldwell Counties revealed no clear pattern in impacts of road construction on wetlands and open waters. On a per-project basis, between 1990 and 2000, yearly impacts to wetlands ranged from 0 acres to 5.99 acres. Lengths of stream reaches affected ranged from 0 to 7,407 feet. Open water impact areas were 0 acres to 3.29 acres. No trend toward greater or smaller amounts of impacts or sizes of impacts over time is evident from the available information.

3.10.3 Threatened or Endangered Species

Federal Listed Species

Species with the federal classification of Endangered (E) or Threatened (T) are protected under the provisions of the Endangered Species Act of 1973, as amended (Title 16, United States Code, Section 1531 [16 USC 1531 *et seq.*]). In the case of a state-funded action, where federal water resource permits are likely to be required, the US Fish and Wildlife Service (USFWS) can require consultation to ensure that a proposed action does not jeopardize any endangered or threatened species. Even in the absence of a federal action, the USFWS has the power through the provisions of Section 9 of the Endangered Species Act, to exercise jurisdiction on behalf of a protected plant or animal. The USFWS and other wildlife resource agencies also exercise jurisdiction in this resource area in accordance with the Fish and Wildlife Coordination Act, as amended (16 USC 661 *et seq.*). North Carolina laws are also designed to protect certain plants and animals, where statewide populations are in decline.

The term "Endangered Species" is defined as "any species which is in danger of extinction throughout all or a significant portion of its range," and the term "Threatened species" is defined as "any species which is likely to become an Endangered species within the foreseeable future throughout all or a significant portion of its range" (16 USC 1532). The term "Threatened due to Similarity of Appearance" authorizes the treatment of species as endangered or threatened even if they are not listed as endangered or threatened if: "a) the species so closely resembles in appearance an endangered or threatened species that enforcement personnel would have substantial difficulty distinguishing between listed and unlisted species; b) the effect of this substantial difficulty is an additional threat to an endangered or threatened species; and c) such treatment of an unlisted species would substantially facilitate the enforcement and further the policy of the Act [Endangered Species Act]." The Federally protected species listed by the USFWS for Caldwell and Watauga Counties as of February 2003 are presented in Table 3-21. A species description and potential adverse impacts are described in Chapter 4. The USFWS list also includes a category of species designated as "Federal Species of Concern" (FSC). The FSC designation provides no protection under the Endangered Species Act.

Table 3-21. Federally Protected Species Listed by the US Fish and Wildlife Service

Common name	Scientific Name	Status[1]	County[2]
Bog Turtle	*Glyptemys (Clemmys) muhlenbergii*	T(S/A)	W
Carolina northern flying squirrel	*Glaucomys sabrinus coloratus*	E	W
Spreading avens	*Geum radiatum*	E	W
Roan Mountain bluet	*Houstonia montana*	E	W
Heller's blazing star	*Liatris helleri*	T	C, W
Spruce-fir moss spider	*Microhexura montivaga*	E	C, W
Dwarf-flowered heartleaf	*Hexastylis naniflora*	T	C

[1] Federal status is indicated as Endangered (E), Threatened (T), or Threatened due to Similarity of Appearance (T[S/A]).
[2] W = Watauga County, C = Caldwell County

Based on a review of NC Natural Heritage Program (NCNHP) files (February 24, 2005), no federally protected species are known to occur within the project area. However, one species is known to occur just south of Bass Lake in the Moses Cone Memorial Park on the Blue Ridge Parkway, approximately 2.0 miles northeast of the project area. This species is bog turtle (*Gleptemys* [*Clemmys*] *muhlenbergii*), which is Threatened due to Similarity of Appearance. Additionally, Heller's blazing star (*Liatris helleri*) was documented at the cliffs of *The Blowing Rock*, approximately 0.2 mile south of the Town of Blowing Rock. Species descriptions and potential adverse impacts are described in Chapter 4.

The presence of potential suitable habitat (Yes or No) within the project area was evaluated for FSC species listed for Caldwell and Watauga Counties. The results are presented in Table 3-22. The North Carolina State status is also listed.

Based on a review of NC Natural Heritage Program (NCNHP) files (February 24, 2005), no FSC species are known to occur within the project area. However, several FSC species are known to occur in the Moses Cone Memorial Park on the Blue Ridge Parkway, approximately 2.0 miles northeast of the project area. These FSC species are Gray's lily (*Lilium grayi*), Diana fritillary butterfly (*Speyeria diana*), and the southern Appalachian yellow-bellied sapsucker (*Sphyrapicus varius appalaciensis*). Additionally, the Alleghany woodrat (*Neotoma floridana magister*) was documented at the cliffs of *The Blowing Rock*, approximately 0.2 mile south of the Town of Blowing Rock.

State Listed Species

Species of mammals, birds, reptiles, amphibians, and plants with the North Carolina status of Endangered, Threatened, or Special Concern receive limited protection under the North Carolina Endangered Species Act (General Statute [GS] 113-331 *et seq*.) and the North Carolina Plant Protection Act of 1979 (GS 106-202.12 *et seq*.). Based on a review of NCNHP files (February 24, 2005), no state-listed species are known to occur within the project area. However, the golden tundra-moss (*Rhytidium rugosum*), a Threatened moss, was documented approximately 0.2 mile west of the project area near *The Blowing Rock*.

The NCNHP listing also include species designated as Significantly Rare and Candidates for listing. These designations provide no protection under North Carolina statutes, though special consideration may be granted. Numerous Significantly Rare plant and animal species were documented between 1.0 to 2.0 miles northwest of the project area in Moses Cone Memorial

Table 3-22. Species Listed as "Federal Species of Concern"

Common Name	Scientific Name	County[1]	Potential Habitat[2]	State Status[3]
Vertebrates				
Southern Appalachian saw-whet owl	*Aegolius acadicus*	C, W	No	T
Hellbender	*Cryptobranchus alleganiensis*	W	Yes	SC
Cerulean warbler	*Dendroica cerulea*	W	Yes	SR
Southern Appalachian red crossbill	*Loxia curviostra*	C, W	No	--
Alleghany woodrat	*Neotoma floridana magister*	C*, W*	Yes	SC
Southern Appalachian black-capped chickadee	*Poecile (Parus) atricapillus practicus*	C, W	No	--
Kanawha minnow	*Phenacobius teretulus*	W	Yes	SC
Southern water shrew	*Sorex palustris punctulatus*	W*	Yes	SC
Southern Appalachian yellow-bellied sapsucker	*Sphyrapicus varius appalaciensis*	C, W	Yes	SC
Appalachian cottontail	*Sylvilagus obscurus*	W*	Yes	--
Invertebrates				
Green floater	*Lasmigona subviridus*	W	Yes	E
Brook floater	*Alasmidonta varicosa*	C, W	Yes	E
Margarita river cruiser	*Macromia margarita*	C*	No	SR
Edmund's snaketail dragonfly	*Ophiogomphus edmundo*	C	Yes	SR
Diana fritillary butterfly	*Speyeria diana*	C, W	Yes	SR
Vascular Plants				
Frasier fir	*Abies fraseri*	C, W	No	--
Mountain bittercress	*Cardimine clematitis*	C, W	Yes	SR-T
Tall larkspur	*Delphenium exaltatum*	W	Yes	E-SC
Glade spurge	*Euphorbia purpurea*	W**	Yes	SR-T
Bent avens	*Geum geniculatum*	C, W	Yes	T
Butternut	*Juglans cinerea*	C, W	Yes	--
Gray's lily	*Lilium grayi*	C, W	Yes	T-SC
Sweet pinesap	*Monotropis odorata*	C*	Yes	SR-T
Bog bluegrass	*Poa paludigena*	W*	No	E
Riverbank vervain	*Verbena riparia*	C*	No	SR-T
Non-vascular Plants				
A liverwort	*Plagiochila sullivantii* var. *sullivantii*	C	Yes	SR-T
A liverwort	*Porella wataugensis*	W*	Yes	SR-L

[1] W = Watauga County, C = Caldwell County

[2] The presence of potential suitable habitats within the project area is given (yes or no).

[3] North Carolina status: (E - Endangered, T - Threatened, SC - Special Concern, SR - Significantly Rare (T-throughout, L-Limited).

* Historic record- the species was observed in the county more than 50 years ago.

** Obscure record.

Park, including two state listed birds, brown creeper (*Certhia americana*) and Savannah sparrow (*Passerculus sandwichensis*). The tongue-tied minnow (*Exoglossum laurae*), a Significantly Rare fish, was documented approximately 2.0 miles north of the project area along US 321 in the Middle Fork/South Fork. A fruticose lichen (*Ephebe americana*), a Candidate for listing, was documented approximately 0.2 mile west of the project area near *The Blowing Rock.*

3.10.4 Natural Resource Protection Policies and Goals

Land Use Plans and Zoning

The Town of Blowing Rock has adopted zoning rules that are based in part on the position of properties within or outside of a protected watershed. Residential densities of up to five dwelling units per acre, with 24 percent impervious surface (roofs, driveways, *etc*.), are permitted within an area that encompasses most of the area in Blowing Rock that is east of US 321 Business and north of US 221. Outside of this area, up to six dwelling units per acre are permitted, with a minimum lot size of 6,000 square feet per dwelling unit (16-182 of Blowing Rock Town Code). For development activities adjacent to perennial streams, the Town requires that a 30-foot vegetated buffer be maintained along the streambanks (16-265.10). Zoning for the Town of Blowing Rock is shown in Figure 3-2.

Watauga County has adopted state mandated zoning rules that apply to the watershed encompassing the South Fork New River. The zoning rules allow densities of up to two dwelling units per acre, with as much as 36 percent built-upon area (Section 302 of the Watauga County Watershed Protection Zoning Ordinance [WCWPZO]). Watauga County requires maintenance of a 30-foot vegetated buffer alongside perennial streams (Section 304, WCWPZO) or a 10-foot buffer for agricultural activities (Section 104, WCWPZO).

Water Quality

Each local government that supplies water to the public has the responsibility to develop and adopt a Water Supply Watershed management and protection program, consistent with minimum standards set by the State (GS 143-214.5). The Town of Blowing Rock submitted a Water Supply System Report in 1992, which was adopted by the Department of Environment and Natural Resources. The plan contains information on water supply, storage, use, and discharge, future water use, and water conservation data.

3.11 Floodplains and Regulatory Floodways

Protection of floodplains and floodways is a goal during the implementation of improvements to US 321. The intent is to avoid or minimize encroachments within the 100-year (base) floodplain by the project, where practicable, and to avoid supporting land use development that is incompatible with floodplain values. The proximity of US 321 and the bypass corridors to area floodplains and their assessed regulatory floodway is shown in Figure 3-10. Natural and beneficial floodplain values of these floodplains include natural moderation of floods, open space, and wildlife habitat.

The 100-year base floodplain and floodway generally parallel the west side of US 321 from where the Middle Fork crosses US 321 (just north of New River Lake Drive) to the northern end of the project area at the intersection of US 321 and Possum Hollow Road. The floodplain and floodway are adjacent to US 321 at two locations and cross US 321 at these same locations.

Figure 3-10. Floodplains and Regulatory Floodways
(Part A)

Figure 3-10. Floodplains and Regulatory Floodways
(Part B)

The flood flow passes though a culvert under US 321 just north of New River Lake Drive. Businesses downstream (south) of the culvert have encountered problems with flooding in the past. Channel improvements and construction of small levees downstream were completed within the past five years. None of the businesses downstream has experienced flooding since the completion of the improvements. However, no major flood events have occurred since the completion of these projects.

In the Bypass Alternative 1 corridor, the only location where a floodplain is proximate to the proposed roadway alignment is at the intersection of US 321 and Possum Hollow Road. The floodplain does not cross the Bypass Alternative 1 corridor.

The Bypass Alternative 4 corridor crosses the floodplain and floodway at two locations at the northern end of the corridor near the intersection of US 321 and Aho Road, where the Aho Branch of the Middle Fork runs parallel to Aho Road. An employee of a retail store at the intersection of US 321 and Aho Road, who has lived in the area for 40 years, said that he has never seen flood flows overtop the existing upstream road structure (Aho Road over the Middle Fork of the New River) and has never seen the river flow out its banks.

3.12 Hazardous Material Sites and Underground Storage Tanks

A field reconnaissance survey was conducted in the vicinity of US 321 and the bypass alternatives' corridors; geographic information system (GIS) mapping for the project area was consulted; and a file search of the records of appropriate environmental agencies was conducted to determine if any hazardous material waste sites, underground storage tanks, regulated landfills, or unregulated dumpsites were within the corridors of the alternatives. No hazardous material waste sites, regulated landfills, or unregulated dumpsites occur within the project area. Five facilities with underground storage tanks were identified in the project corridors. Three of these facilities are gasoline stations along US 321, one is a furniture establishment, and one is a private residence. None of the sites appears to be under remediation at this time.

3.13 Utilities

Utilities in the alternative corridors include water and sewer, telephone, electric lines, and cable television. Charter Communications' cable television shares the electric utility poles. All the utility types are found along US 321 and in the Bypass Alternative 1 corridor. The only utilities in the Bypass Alternative 4 corridor are telephone and electric. They are at the corridor's northern end at Aho Road. Electric power substations are on Possum Hollow Road and on Aho Road near their intersections with US 321.

3.13.1 Water and Sewer

A private water and sewer line (not owned by the Town of Blowing Rock) is on the east side of US 321 between the Blackberry Condominiums and a point approximately 600 feet south. The Town of Blowing Rock's water and sewer service begins in the project area at the intersection of Rock Road and Green Hill Road with US 321. The water and sewer lines feed both Rock Road and Green Hill Road. Water service continues north along the east side of US 321 before it crosses US 321 at Country Club Drive. Water lines continue to run along the west side of US 321 ending near West Cornish Road with lines feeding Ransom Street, New River Lake Drive, Sunset Drive, and West Cornish Road. A sewer line runs the east side of US 321 and feeds Goforth

Road, Country Club Drive, Norwood Circle, and Skyland Drive. The sewer line crosses existing US 321 at its intersection with Pinnacle Avenue and follows US 321 on its west side to Ransom Street. Another sewer line continues north along US 321 and ends at Church Street and serves both New River Lake Drive and Church Street to Main Street. Another sewer line then begins on the east side of US 321 and crosses and ends US 321 at Sunset Drive. It serves Sunset Drive and West Cornish Road. A sewer line crosses US 321 approximately 400 feet north of West Cornish Road, serves the Blowing Rock Community Art Center (under construction as of May 2001), and connects to lines east of US 321 and to Main Street. A private water and sewer line follows the east side of US 321 beginning at the Food Lion driveway and connects to the lines at Westview Drive. The main sewer line from the town's wastewater treatment plant and a water line cross US 321 at Possum Hollow Road and feed Possum Hollow Road and the Shoppes on the Parkway. It continues along Main Street into Blowing Rock. (The streets referenced are shown on Figure D-1d to Figure D-1h.)

In the Bypass Alternative 1 corridor, water and sewer lines are present at the corridor's crossings of Green Hill Road, Wonderland Drive, and Possum Hollow Road. A water line from the water tank on Green Hill, which serves all of Blowing Rock, crosses Green Hill Road, Green Hill Woods (a street), and Fairway Court and ties into a line on Wonderland Drive. A water and sewer line follows Green Hill Road to its intersection with Wonderland Drive. A force main crosses over Green Hill Road and runs along Green Hill Woods to its intersection of Green Hill Road. A water and sewer line follows Wonderland Drive to Goforth Road. Water and sewer service is provided along Possum Hollow Road from the Shoppes on the Parkway to Sunset Drive. (The streets referenced are shown on Figure D-2e to Figure D-2g.)

There are no water and sewer lines in the Bypass Alternative 4 corridor.

3.13.2 Telephone

BellSouth provides telephone service to the project area. BellSouth has toll and distribution lines throughout the project area that cross US 321 via overhead wires at several points. BellSouth also has a buried cable along US 321 that was abandoned over 20 years ago. From the Shoppes on the Parkway along Possum Hollow Road and along US 321 north to Aho Road, BellSouth has underground cables with manholes and duct structures.

The Bypass Alternative 1 corridor crosses Green Hill Road, Wonderland Wood Drive, and Wonderland Drive where BellSouth has single aerial distribution lines. BellSouth has a remote terminal at Aho Road at the end of the Bypass Alternative 4 corridor.

3.13.3 Electric and Cable Lines

Blue Ridge Electric provides electric service to the project area. Blue Ridge Electric has an aerial transmission line that runs behind the Blackberry Condominiums and continues north below US 321 to the area of the Caldwell/Watauga County Line. Along US 321 and throughout the project area, Blue Ridge Electric has three-phase aerial lines with many taps and feeders to clients in the area. They have scattered underground lines with the main feeders overhead and mostly single phase lines on local streets. Blue Ridge Electric owns power substations on Possum Hollow Road and on Aho Road near their intersections with US 321. Charter Communications' cable television shares the electric utility poles.